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# Public Health Reports

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TUBERCULOSIS CONTROL ISSUE NO. 5

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- Photofluorography of the Clothed Subject



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# Public Health Reports

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## EDITORIAL

### TUBERCULOSIS CONTROL: PAST AND FUTURE

Since the year 1882 when Koch announced the discovery of the tubercle bacillus, many advances have been made in the struggle to control and to eradicate tuberculosis from our population. A most important weapon in the fight was the X-ray, which Roentgen discovered in the fall of 1895. In the decades that have followed these great discoveries, leaders in the field of tuberculosis have developed new methods and organized programs which have made us realize that tuberculosis, for many years in decided retreat, can be destroyed as a plague of man.

In 1890 the tuberculosis death rate in the United States was 245 per 100,000 population. By 1904 it had declined to 200. In that year there were only 6 tuberculosis control programs in the country, and only 100 tuberculosis sanatoria and hospitals. Few of the 10,000 beds in these institutions could measure up to present-day minimum standards. There were no dependable means for the early diagnosis of the disease. When tuberculosis was discovered, it was far advanced and death soon followed. Little was done to isolate consumptives, as they were called, and people by the thousands were brought in close contact with virulent organisms. Because it was believed that "consumption" was an inherited disease, social stigma attached to it. Every year tuberculosis claimed the lives of thousands of children. Young men and women, who had arrived at that period in life when one is most productive, faced certain death when a diagnosis of tuberculosis was made. Because little was done to slaughter tuberculous cattle, bovine tuberculosis attacked man, and extra-

\*This is the fifth of a series of special issues of Public Health Reports devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the Public Health Reports. Effective with the July 5 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at \$1.00 per year; \$1.25 foreign.

pulmonary tuberculosis was widespread. In consequence, certain far-seeing men determined to organize their efforts toward the control of this dread disease. In 1904 the National Tuberculosis Association was organized, and in New York, Boston, Philadelphia, Chicago, Washington, and Cambridge, Mass., systematized control programs were inaugurated.

The next decade, the years between 1905 and 1915, was a time of significant advances in sanatorium treatment and health education. Although fresh-air therapy, high altitude, and even mountain climbing were regarded as efficacious in the treatment of tuberculosis, definite attempts were made to provide healthy environments for the tuberculous, and isolation was seen as necessary. This was also the period in which pneumothorax treatment was initiated, and many tuberculosis specialists emphasized rest as basic in the treatment of tuberculosis. Some actual treatment with tuberculin was undertaken, but soon was abandoned as unsatisfactory.

Between the years 1915 and 1925, the years of World War I and its aftermath, chest surgery, especially thoracoplasty, was tried and found useful. There was a decrease in use of open-air treatment and an increase in emphasis on hospital care. Early diagnosis was encouraged and preventoria were established for children in an attempt to build resistance against tuberculosis in those who had been subject to massive infection. Ancillary services in State health departments and the beginnings of control on a mass basis, especially with tuberculin tests, make this period the time when modern control measures began.

The epidemiological aspects of tuberculosis were particularly emphasized in the next decade, 1925 to 1935. Extensive examination of contacts was undertaken, and a more exact knowledge of morbidity and mortality was attained. Increasing emphasis was placed on early diagnosis, with the objective of discovering cases in early stages when they might be relatively easily arrested. Modern production methods made possible the wider distribution of X-ray equipment, and there followed an increased use of the X-ray for diagnostic purposes. Diagnosis by percussion and auscultation was at last regarded as inexact and became merely a concomitant of X-ray diagnosis. In Europe at this time Calmette and Guérin began experimenting with BCG vaccine with the aim of demonstrating that a limited immunity could be given to children in hazardous environments. Everywhere tuberculosis specialists used the pneumothorax treatment more selectively, and pneumonolysis and bronchoscopy came into their own.

It was in the decade between 1935 and 1945 that all control methods came to their highest peak of development. Mass radiography, with the development of the photofluorograph and the automatic photo-

timer; experiments in chemotherapy and antibiotics; greatly expanded research in epidemiology; health education; the development of an official national control program; and the expansion of control methods in industry, general hospitals, and the armed forces, marshalled the power of science and shaped the knowledge and understanding of men in the fight against tuberculosis. In surgery, the thoracoplasty operation was refined and used more selectively and pneumonectomy was introduced. Global war, with its severe dislocations and demands, challenged the ingenuity of medical science in this field, and all methods of control were carried to every corner of the world. In spite of the rigors of wartime, the death rate from tuberculosis in the United States in 1944 was down to 41.3 per 100,000 population.

Now in 1946 we must set up a basic pattern for the future. Expansion of all field services, research, adequate hospital and outpatient facilities, invalidity insurance for handicapped persons, especially tuberculous families, are fundamental in such a pattern. No future activity in tuberculosis control can be effective if we do not constantly advance our knowledge, provide adequate hospital beds, and see to it that the tuberculous are protected against disaster. Over a measured period of time the present decrease in mortality from this disease must continue and in the face of diminishing returns we must speed up and increase the force of our efforts. The future requires a balanced program, integrated action, and widespread information about tuberculosis as an individual and community problem.

In 1935, on the fiftieth anniversary of the establishment of the first American sanatorium, Dr. Wade Hampton Frost declared, "Eradication of tuberculosis is now an expectation sufficiently well grounded to justify shaping our tuberculosis control program toward this definite end. We have reached the stage at which the biological balance is against the survival of the tubercle bacillus and, as demonstrated by the steadily falling morbidity and mortality rates, each existing case has for some time been giving rise to less than one new case of the disease. If this balance can be maintained and the source of infection further reduced, the control of tuberculosis is within our grasp."

## A LIGHT, COMPACT X-RAY GENERATOR OF HIGH EFFICIENCY FOR MASS RADIOGRAPHY OF THE CHEST<sup>1</sup>

By RUSSELL H. MORGAN, *Senior Surgeon (R)*, and EMMET G. MURPHY, *Design Engineer, United States Public Health Service*

For some time there has been an increasing need in mass radiography of the chest for a small light-weight X-ray generator capable of operation from 110-v. domestic power lines. Such a generator would greatly facilitate mass chest surveys out in small communities and in rural areas where sources of power are often inadequate to operate most conventional generators. Furthermore, it would markedly simplify surveys conducted in industry where ease of transportation and handling is highly desirable.

The self-rectified type of X-ray generator has been frequently proposed for use where a light-weight unit is required. Although this type of generator may be made small and compact, it unfortunately possesses electrical characteristics which make it unusable when poor sources of power are encountered. The X-ray tube draws power only during one-half of the alternating current cycle; during the unused half of the cycle the voltage to which the cables connecting the generator and X-ray tube are subjected may exceed the tolerance limits by many kilovolts with resulting break-down of these components after a few exposures.

The condenser discharge type of X-ray generator often has been proposed where poor sources of electrical power prevail. If the unit, however, is to possess adequate capacity for the radiography of all individuals, it becomes unduly bulky. Furthermore, experience has shown that break-downs due to failure of cables and other components are not infrequent.

The best solution to the problem of operating mass radiographic equipment from domestic power lines has been the use of 200-milliamperage generators which are also designed to operate from 110-v. power sources at greatly reduced milliamperage (e. g., 30 milliamperage). These units are full-wave rectified and therefore do not have the inherent weakness of self-rectified generators. Furthermore, when operating at 30 milliamperes, they draw only 20 amperes from the 110-v. power line. This is not only less than the amperage usually tolerated by such lines, but also is within the range which may be supplied by the small 3-kw. motor-generator sets, which were made for Army field X-ray equipment and used where a source of electrical power was not available. The only disadvantage of operating an X-ray generator at 30 milliamperes is that exposure times will range between 1.5 and 3.0 seconds. Therefore, it will be difficult to maintain all individuals completely immobilized for such long periods of time. In addition, the generator, as previously pointed out, is relatively heavy.

<sup>1</sup> From the Radiology Section, Tuberculosis Control Division.

The objections found in the various generators just described have been effectively overcome, it is believed, in the generator to be described in this paper. It is light in weight. The entire unit, including the control panel, transformer, cables, X-ray tube, photofluorographic automatic camera, automatic timer, and protective screen, weighs 600 pounds instead of the usual 1,200 to 2,000 pounds. The generator operates from conventional 110-v. power lines and draws between 25 and 30 amperes when the X-ray tube is operating at 90 kilovolts and 30 milliamperes. The exposure times under normal conditions

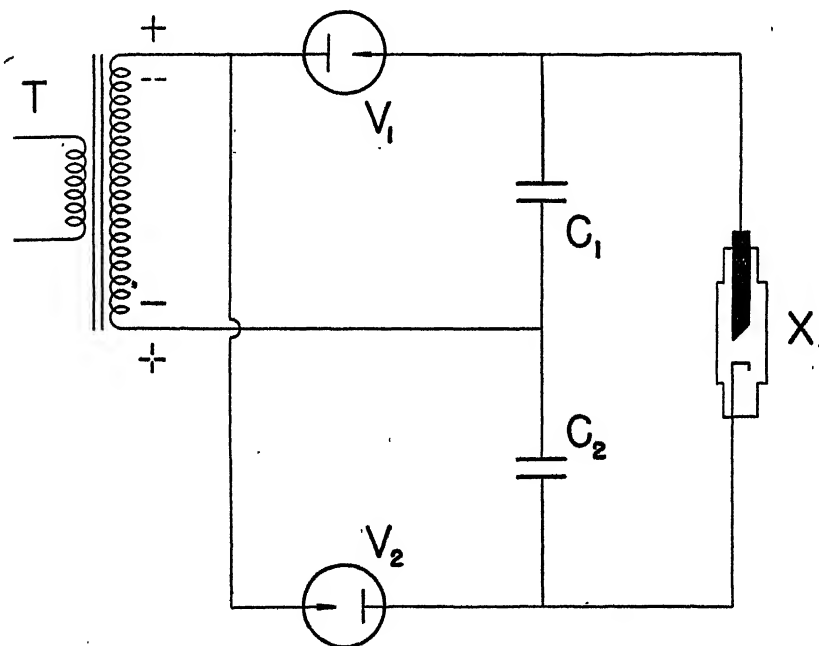


FIGURE 1.—Fundamental circuit arrangement of constant potential generator.  $T$ , high voltage transformer;  $V_1$  and  $V_2$  rectifier tubes;  $C_1$  and  $C_2$ , condensers;  $X$ , X-ray tube.

range from 0.35 to 0.70 second. Furthermore, the efficiency of operation is 60 percent greater than the conventional generator and accordingly the X-ray tube remains proportionately cooler during normal schedules.

The generator is of the constant-voltage type in contradistinction to conventional pulsating generators; that is, the voltage applied to the roentgen tube remains essentially constant during the exposure and does not rise to a maximum and fall to zero during each  $\frac{1}{20}$  second. The circuit employed is full-wave rectified and of the voltage-doubling type; the constant potential feature is provided by two 0.06-microfarad condensers, series connected and placed across the X-ray tube.

The fundamental circuit design is illustrated schematically in figure 1, where  $T$  is a high-voltage transformer capable of producing a



secondary voltage approximately one-half that desired on the X-ray tube;  $V_1$  and  $V_2$  are rectifier tubes;  $C_1$  and  $C_2$  are 0.06 microfarad condensers; and  $X$  is the X-ray tube. During the half cycle in which the polarity of the secondary winding of the transformer is that indicated by the solid symbols, the condenser ( $C_1$ ) becomes charged to a potential equal to the peak voltage of the transformer. This charge is delivered to the condenser through the rectifier tube ( $V_1$ ). During this half of the cycle, condenser ( $C_2$ ) is isolated from the transformer

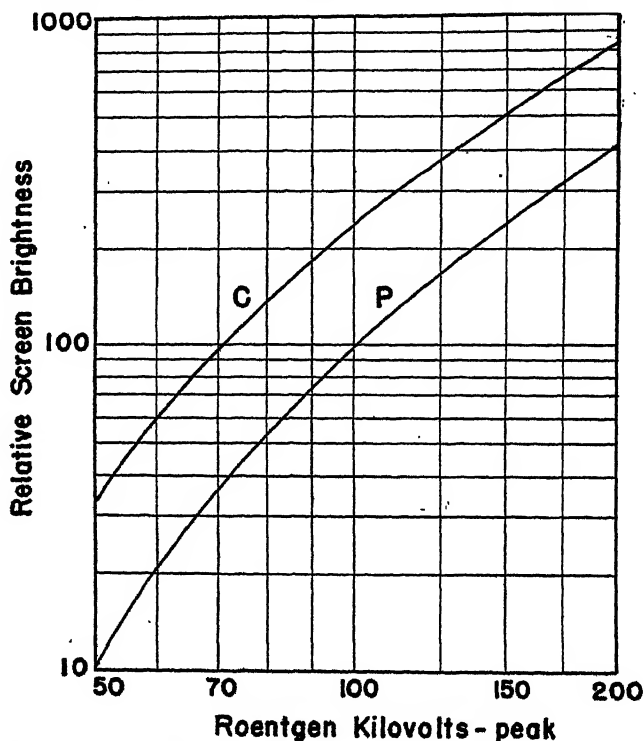


FIGURE 2.—Relative brightness of typical photofluorographic screen plotted as a function of the peak voltage applied to the X-ray tube. C, constant potential generator; P, conventional pulsating generator.

by the rectifier ( $V_2$ ) which prevents any current flow as long as the polarity of the transformer is that indicated by the solid symbols. During the half cycle in which the transformer polarity is that indicated by the broken symbols, condenser ( $C_2$ ) becomes charged to the peak voltage delivered by the transformer through the rectifier ( $V_2$ ). Subsequently on alternating half cycles, first condenser ( $C_1$ ) and then condenser ( $C_2$ ) becomes charged to the peak voltage delivered by the transformer. Since the two condensers are series connected, the voltage applied to the X-ray tube to which they are connected is twice that delivered by the transformer. Thus the circuit is a voltage-doubling type. Furthermore, since the condensers lose to the X-ray tube only a small amount of their charge before they become re-

charged, the voltage applied to the X-ray tube is essentially constant. Indeed, at 30-milliamperere operation the voltage drop during each half cycle is 7.5 kv. and at lower milliamperages is proportionately less. That is, the voltage, during each half cycle, instead of rising to a maximum and falling to zero volts, rises to a maximum and then falls only to 7.5 kv. below that maximum.

The advantages of this type of operation are graphically illustrated in figure 2 where the brightness of a conventional Patterson type "D" fluorescent screen is plotted as a function of the peak kilovoltage applied to the X-ray tube when  $C$ , the voltage, is constant and  $P$  is when the voltage is pulsating sinusoidally. The conditions under which the data presented in figure 2 were obtained included the operation of the roentgen tube at a fixed milliamperage and with a phantom of Masonite presdwood, 10 cm. in thickness placed in the roentgen beam. A conventional stationary grid was placed between the phantom and the photofluorographic screen. The thickness of phantom employed was that shown by Chamberlain (1) to be equivalent in absorption to that of an average individual's chest.

It is evident from figure 2 that at a given kilovoltage and milliamperage, a considerably greater brightness may be obtained from the photofluorographic screen when the X-ray tube potential is constant. Indeed at 90 kv. (peak) the brightness is 2.3 times greater than that obtained with a pulsating potential. This is largely responsible for the short exposure times which may be obtained with this generator in spite of the low milliamperages employed. The generator, at 30 milliamperes, produces as great a screen brightness as a conventional generator operating at 70 milliamperes.

The gain in screen brightness is not the only advantage of the constant potential generator. There is also a considerable increase in efficiency, with a corresponding decrease in the temperature assumed by the X-ray tube. In figure 3, the efficiency of a constant potential generator ( $C$ ) and of a sinusoidally pulsating generator ( $P$ ) are plotted as a function of the peak voltage applied to the X-ray tube. It is evident that a considerable gain in efficiency may be obtained by employing the former type of generator. This is an extremely desirable characteristic because, as is well known, conventional generators under normal operating schedules frequently cannot liberate the heat generated within the X-ray tube sufficiently fast to avoid failures and break-downs. The very sizable gain in efficiency provided by the constant potential generator effectively eliminated this difficulty.

The control panel and transformer unit of the X-ray generator are illustrated in figure 4. Both are mounted on a frame carriage with the transformer resting on the lower platform and the control panel on the upper. By means of the carriage the generator may be easily moved. The control panel weighs 50 pounds and the transformer 220 pounds.

The control unit includes an autotransformer for kilovoltage selection, an X-ray tube filament regulator, a photoelectric timer, an adjustable electronic timer, a time-delay circuit, a relay for supplying power to the rectifier tubes and a contactor for supplying power to the high-voltage transformer in the transformer unit.

The control panel includes a kilovoltage selector switch, an X-ray tube filament control, a combined line volt and kilovolt meter, an X-ray tube filament current meter and a milliammeter for measuring the current passing through the X-ray tube. Also included are switches which may be used to select the small or large focal spots of the X-ray tube, to place in operation the automatic camera of the photofluorograph if desired, to select either the line voltage or kilo-

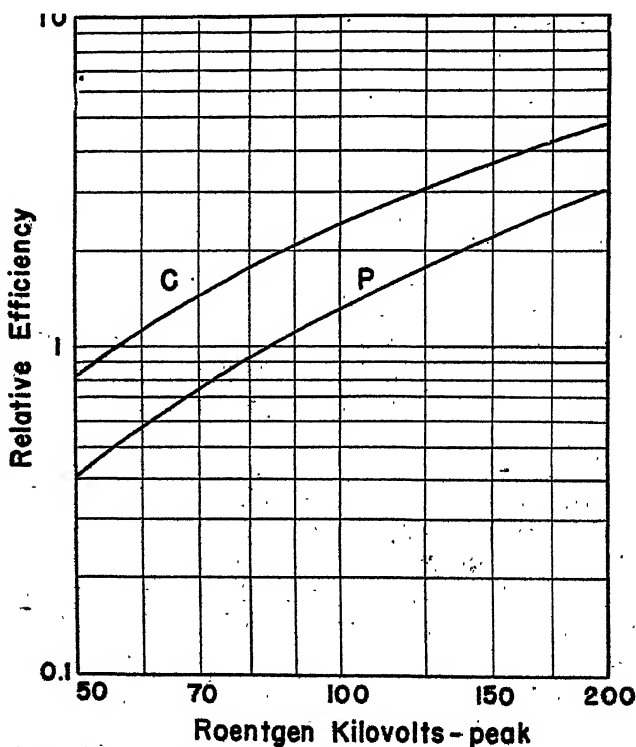


FIGURE 3.—Relative efficiency (screen brightness divided by power output) of C, a constant potential generator, and P, a conventional pulsating generator, plotted as a function of the peak voltage applied to the X-ray tube.

voltage scales of the voltmeter and to select the photoelectric or adjustable electronic timer. In addition to the foregoing, the dial of the electronic timer and the exposure switch are also mounted on the control panel.

The transformer unit includes a high-voltage transformer, two rectifier tubes, two rectifier tube filament transformers, two X-ray

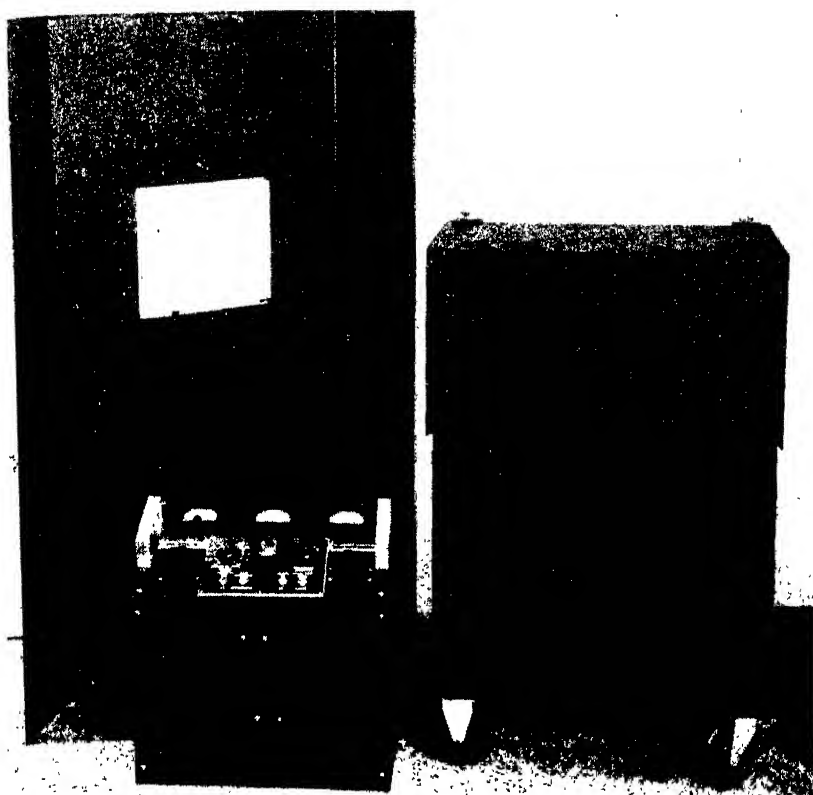


FIGURE 4.—Lightweight constant potential generator.

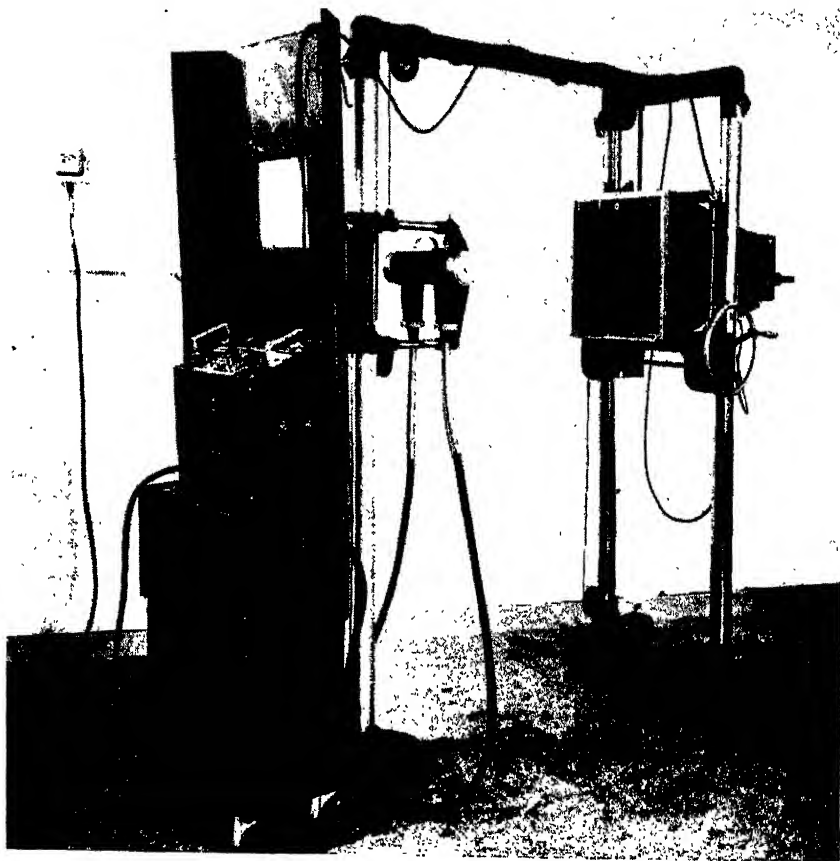


FIGURE 5.—Constant potential generator arranged with photofluorographic assembly.

The schematic diagram illustrates the automatic camera control circuit. It features a power supply section with a 10000 ohm resistor and a 25V source, connected to a 75,000 ohm resistor and a 10mfd capacitor. The camera tube section includes a 617 tube, a 617 tube, and a 617 tube, connected to a 10mfd capacitor and a 10mfd capacitor. The control section includes a 10mfd capacitor, a 10mfd capacitor, and a 10mfd capacitor, connected to a 10mfd capacitor and a 10mfd capacitor. The diagram also shows a 10mfd capacitor, a 10mfd capacitor, and a 10mfd capacitor, connected to a 10mfd capacitor and a 10mfd capacitor.

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The various components of the generator are so connected that the following series of events occurs when the unit is operated. When the line switch is turned on, the X-ray tube filament lights, and power is supplied to the photoelectric and electronic timers and to the time-delay circuit. The line voltage and approximate voltage that will be applied to the X-ray tube are also indicated on the voltmeter. When the exposure switch is closed, the relay supplying power to the filaments of the rectifier tubes in the transformer unit is closed and the time-delay circuit is energized. After a time delay of 1.5 seconds, the time-delay circuit closes a pair of contacts which causes the contactor to be energized and thereby power to be supplied to the high-voltage transformer and subsequently to the X-ray tube. After a time governed by the photoelectric or electronic timers, depending on which one is used, the contactor is de-energized and power to the X-ray tube terminated. When the exposure switch is opened, the filaments of the rectifier tubes turn off and the various time-delay and timer circuits are prepared for the next exposure. The rectifier tubes are purposely not heated until the exposure sequence is begun to avoid excessive heating of the oil within the transformer unit.

The circuit as shown in figure 6 includes a stationary anode rather than a rotating anode tube. The latter type may be easily substituted for the former but there is little reason to do so. When a stationary anode tube is operated at 30 milliamperes, a focal size of 2.3 mm. may be used even on exposures approaching 5 seconds. Such a focal size is well below the limit at which unsharpness due to the X-ray tube focus occurs for all types of photofluorography. The slightly smaller size which may be obtained with a rotating anode tube therefore would not improve the clarity of the photofluorograms. Furthermore, the stationary anode tube is considerably less expensive and lighter in weight than the rotating anode type. Thus, in this application it seems to be preferable.

The generator with its protective screen is illustrated in figure 5 with a conventional Westinghouse photofluorograph equipped with a Recordak type automatic camera. The tube screen distance has been reduced to 30 inches and the usual limiting cone on the X-ray tube has been supplanted by an equally effective diaphragm to permit more space between the tube and screen in which the technician can position his patients. The lead glass customarily located in the photofluorographic hood has been removed to lessen weight. This is well in accord with recent practice (2). The protective screen is constructed of sheet steel  $\frac{1}{8}$  inch in thickness. It provides the technician sufficient protection for more than 1,000 exposures per day.

The tube-screen distance has been reduced to 30 inches to limit exposure times and to decrease the quantity of heat generated within the X-ray tube. This reduction in distance does not cause significant distortion of the photofluorographic images and shortens exposure times to approximately one half. Normally a conventional generator operating at 90 kv. (peak) and 30 milliamperes requires exposure times of 1.5 to 3.0 seconds under average photofluorographic conditions. The use of constant potential reduces this range to 0.65 to 1.3 seconds. Diminishing the tube-screen distance to 30 inches reduces it to 0.35 to 0.7 second or to a range approaching that of a conventional generator operating at normal capacity. As a result of these changes, the generator may be operated as quickly as photofluorographic schedules can be maintained without overheating the tube. Indeed, in a test run the generator was operated at a rate of 10 exposures per minute for a period of several thousand consecutive exposures with neither the X-ray tube or any other component becoming defective. Such an exposure rate is far greater than that which can be normally maintained and certainly indicates that heavy photofluorographic schedules can be followed without disastrous break-downs.

As stated previously this generator operates from 110-v. domestic power lines and when running at 30 milliamperes draws between 25 and 30 amperes from the line. Such an amperage may be readily obtained from most power lines and also from small 3-kw. motor-generator sets. When power lines are poor, the generator may be operated at 15 milliamperes without serious increase in exposure time (i. e., 0.7 to 1.4 sec.). The advantages of high efficiency and X-ray output are thus retained.

From the foregoing it appears that the constant potential generator supplies a distinct need in the field of photofluorography. Its light weight (270 lb.) makes it possible to produce a complete photofluorographic unit weighing approximately 600 pounds. Its high X-ray output permits operation from domestic power lines without the disadvantage of long exposure times. Finally its high efficiency permits operation even under the most rigorous photofluorographic conditions without the customary excessive heating of the X-ray tube.

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## AN EVALUATION OF A CHEST X-RAY RESURVEY OF AN INDUSTRIAL PLANT<sup>1</sup>

By MORTON KRAMER,<sup>2</sup> GEORGE W. COMSTOCK,<sup>3</sup> and JOSEPH B. STOCKLEN<sup>4</sup>

### Introduction

As the mass chest survey movement gains momentum there will undoubtedly be requests for resurveys. The question arises as to the value of this procedure in the tuberculosis control program.

The fundamental purpose of a mass chest survey is to discover cases of tuberculosis<sup>5</sup> not previously known to the health department by examining radiographically various segments of the population. To be of value, therefore, repeat surveys should be directed at those industries and groups in which there is reason to expect, at intervals, a significant number of new or unknown cases of tuberculosis. The selection of such groups will depend upon knowledge of several factors, among which are the interval since the first survey, labor or membership turnover within this period, the racial and economic characteristics of the group, the thoroughness of preplacement examinations, the hazard of silicosis, the incidence of tuberculosis in persons whose X-rays were previously reported as normal, and the completeness of case reporting in the area. Since the relative importance of each of these factors may vary greatly as between different industries and communities, it is clear that at the present time there can be no general rule regarding the frequency of resurveys. Nevertheless, the accumulated experience of many observers will be of value in singling out the population groups for which periodic mass X-ray examinations are indicated.

The purpose of the present paper is to report the results of two mass chest X-ray surveys done after an interval of 18 months in a large industrial concern in Cleveland, Ohio. It is hoped that the discussion of the comparative results of these two surveys will throw some light on the following questions:

(a) How much tuberculosis may be expected among persons reported to be nontuberculous in the first survey; and of this, how much was missed at the time, and how much apparently developed in the interval between surveys?

(b) What was the prevalence of tuberculosis among new employees, i. e., persons hired between surveys?

<sup>1</sup> From the Cuyahoga County Tuberculosis Clinic, Cleveland 15, Ohio.

<sup>2</sup> Tuberculosis statistician for Cuyahoga County.

<sup>3</sup> Senior Assistant Surgeon, U. S. Public Health Service, on loan to Cuyahoga County from the Tuberculosis Control Division.

<sup>4</sup> Controller of tuberculosis for the 6 health districts of Cuyahoga County.

<sup>5</sup> "Tuberculosis" as used in this paper denotes clinically significant tuberculosis, and includes all stages of reinfection-type tuberculosis, silico-tuberculosis, pleurisy with effusion, and noncalcified primary phase tuberculosis.

(c) How many cases of tuberculosis found in each survey were not previously known to the health department?

#### Type of Plant

The industrial plant studied is engaged in the manufacture of airplane and automobile parts and employs more than 6,000 persons. There is no known silicosis hazard. The factory was not a "war baby" and there has been relatively little change either in the physical set-up of the plant or personnel during the war years. The management is sincerely interested in the health of the employees, not only from humanitarian motives, but also because they know this interest pays tangible dividends. The preplacement examinations, although otherwise thorough, do not include chest X-rays unless the patient has signs or symptoms suggestive of intrathoracic disease. The wage scale is above the general average in this area and relatively few employees would be classified as unskilled.

#### Survey Procedure

The initial survey was carried out in November 1943. The photo-fluorograph equipment was adapted to the purpose and did not include a phototimer. Perforated 35-mm. film was used. The subjects were required to strip to the waist and don paper jackets. The race, sex, and age of each person examined were recorded, but because of a shortage of clerical help these variables could not be tabulated. On the second survey, made in May 1945, equipment designed for survey procedures was used with a Morgan-Hodges phototimer and Fairchild 70-mm. camera. The films were taken with the employees clothed, a procedure which has been found to be entirely satisfactory (1), (2). The race, sex, and age of each examinee were recorded on a mark-sense tabulating card and, in addition, each person was asked the following questions:

1. Were you employed here during the month of November 1943?
2. If so, were you examined on the survey at that time?

The medical officers and other survey personnel were entirely different for each survey. The physicians reading the miniature films did not know that their interpretations were to be used for comparative study.

Each survey had to be completed in a period of 2 weeks, since adequate space could be obtained only by using an area temporarily available during plant alterations. This is more rapid than is considered advisable, and made it necessary to read the miniature films more hurriedly than is the usual practice. This was particularly true of the second project where, because of illness in the survey team, the Medical Officer and two technicians (one a student in

training) were the only personnel available to take, process, and read the films.

On both occasions, 14" x 17" films were taken of all persons whose miniature films indicated the possibility of any significant abnormality.

### Numbers of Persons Examined

The approximate number of employees on the average daily pay roll and the number and percent volunteering for examination in each of the two surveys were as follows:

	1943 survey	1945 survey
Average daily pay roll (persons).....	6,900	6,400
Number examined.....	6,287	5,679
Percent examined.....	91.1	88.7

For the 1945 survey, 3,169, or 55.8 percent, were white males; 1,876, or 33.0 percent, white females; 492, or 8.7 percent, nonwhite males; and 142, or 2.5 percent, nonwhite females. Although no complete break-down of persons examined in 1943 by race and sex is available, a study of persons examined on both surveys indicates that the race and sex distribution of persons examined in 1943 did not differ significantly from that in 1945.

To determine how many of the persons X-rayed in 1945 were (a) employed and examined in November 1943, (b) employed but not examined in 1943, and (c) not employed in 1943, the answers to the employment questionnaire were tabulated (table 1).

TABLE 1.—*Employment and survey status in November 1943 of persons examined in 1945, by race and sex*

Employment and survey status (November 1943)	All races			White			Nonwhite		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Number									
Total examined 1945 survey.....	5,679	3,661	2,018	5,045	3,169	1,876	634	492	142
Status November 1943 unknown.....	219	128	91	181	99	82	38	29	9
Status November 1943 known.....	5,460	3,533	1,927	4,864	3,070	1,794	596	463	133
Employed and examined November 1943.....	3,981	2,763	1,198	3,683	2,525	1,158	298	258	40
Employed, not examined November 1943.....	195	113	82	165	92	73	30	21	9
Not employed November 1943.....	1,284	637	647	1,016	453	563	268	184	84
Percent									
Total examined 1945 survey.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Status November 1943 unknown.....	3.9	3.5	4.5	3.6	3.1	4.4	6.0	5.9	6.3
Status November 1943 known.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Employed and examined November 1943.....	72.9	78.8	62.2	75.7	82.2	64.5	50.0	55.7	30.0
Employed, not examined November 1943.....	3.6	3.2	4.2	3.4	3.0	4.1	5.0	4.6	6.3
Not employed November 1943.....	23.5	18.0	33.6	20.9	14.8	31.4	45.0	39.7	63.2

Approximately 96 percent of the persons answered the questionnaire. On the basis of their answers, 73 percent of the persons examined in 1945 were also examined in 1943; 4 percent were employed in 1943 but not examined at that time; and 23 percent were hired after November 1943.

The race-sex group with the highest percentage of persons examined on both surveys was white males (82 percent), followed in order by white females (65 percent), Negro males (56 percent), and Negro females (30 percent).

#### Comparison of Results

A comparison of the number and percent of persons diagnosed as tuberculous at the conclusion of each survey is presented in table 2. The prevalence rate was 1.3 percent in the first survey, and 1.4 percent in the second, both slightly lower than the similarly determined rate of 1.6 percent in 102,000 mass X-ray examinations among the industrial population of Cuyahoga County (3). The distribution of cases by stage of disease is essentially the same as that reported on other mass surveys (4), with approximately two-thirds of the cases in the minimal stage.

TABLE 2.—*Distribution, by type of lesion, of cases of significant tuberculosis reported at the completion of surveys in November 1943 and in May 1945*

Type of lesion	Number		Percent	
	1943	1945	1943	1945
Total.....	83	78	100.0	100.0
Minimal.....	57	48	68.7	61.5
Moderately advanced.....	21	23	25.3	29.5
Far advanced.....		3		3.8
Stage unknown.....	2	1	2.4	1.3
Silico-tuberculosis.....	2	2	2.4	2.6
Pleurisy with effusion.....	1		1.2	
Non-calcified primary.....		1		1.3

One of the first questions arising from the comparison of these surveys is, how many of the persons diagnosed as tuberculous in 1943 were still employed in 1945 and what was their 1945 survey diagnosis? To answer this, the names of the 83 cases discovered in 1943 were checked against the 1945 file of survey cards. Those that could not be located were checked in the plant employment office to determine whether they were still employed. The results of this search are as follows:

*Status in 1945 survey of persons diagnosed as tuberculous on 1943 survey*

	Number	Percent
Total.....	83	100.0
Not employed in 1945.....	21	25.3
Employed in 1945.....	62	74.7
Diagnosed as tuberculous in 1945.....	32	38.5
Diagnosed as nontuberculous in 1945.....	16	19.3
Not examined in 1945.....	14	16.9

Of the 21 persons diagnosed as tuberculous on the 1943 survey, but not employed in 1945, 14 were minimal cases, 5 moderately advanced, and 2 cases reinfection type tuberculosis, stage unknown. Their status at the time of the second survey was as follows:

(a) *Minimal cases.*—Six have been attending the clinic regularly for follow-up examinations and their disease has remained stable. The others have not reported for examination since the survey, but it is known that none has been hospitalized in either of the two tuberculosis sanatoria of this county.

(b) *Moderately advanced cases.*—Two hospitalized within 3 months after the first survey were still in the sanatorium at the time of the resurvey; two have been attending the clinic regularly for periodic X-ray examinations and one is under the care of a private physician.

(c) *Cases of reinfection tuberculosis, stage unknown.*—One is under clinic supervision; the only information on the other is an examination from a plant survey done in September 1944, which revealed no change from his diagnosis of November 1943.

A review of the films of the 16 persons diagnosed as tuberculous in 1943 and nontuberculous in 1945 revealed that, on the 1945 survey reading, lesions were missed in nine persons (eight minimal and one moderately advanced); in another the minimal lesion was presumably hidden behind the clavicle on the 1945 film. In the remaining six the diagnosis of tuberculosis in 1943 was in error. A description of the films of each case is given in appendix A.

To determine the 1943 status of the 78 cases of tuberculosis found in the 1945 survey, the names of these persons were checked against the 1943 survey records with the following results:

*Status on 1943 survey of persons diagnosed as tuberculous on 1945 survey*

	Number	Percent
Total.....	78	100.0
Not employed in 1943.....	17	21.8
Employed in 1943.....	61	78.2
Diagnosed as tuberculous in 1943.....	32	41.0
Diagnosed as nontuberculous in 1943.....	28	35.9
Not examined in 1943.....	1	1.3

In table 3 there is presented a comparison of the 1943 and the 1945 survey readings for the 32 persons diagnosed as tuberculous on both surveys.

TABLE 3.—*Comparison of 1945 film interpretations with those of 1943 for persons diagnosed as tuberculous on both surveys*

1945 reading	Total	1943 reading		
		Minimal	Moderately advanced	Far advanced
Total.....	32	22	10	-----
Minimal.....	18	18	-----	-----
Moderately advanced.....	11	4	7	-----
Far advanced.....	1	-----	1	-----
Silico-tuberculosis.....	2	-----	2	-----

In 25 cases (18 minimal and 7 moderately advanced) there was no difference between the two survey readings. In six instances, although there was no change in the lesions, the 1945 survey diagnosis differed from that of 1943 because of difference in interpretation; 4 cases of moderately advanced tuberculosis in 1945 were called minimal in 1943, and 2 cases of silico-tuberculosis in 1945 were called moderately advanced tuberculosis in 1943. The one person with far advanced tuberculosis in 1945 actually developed progressive disease between surveys.

It was possible to locate the 1943 films of 25 of the 28 persons diagnosed as tuberculous in 1945 and nontuberculous in 1943. A review of these films showed that 5 persons had apparently developed minimal tuberculosis since November 1943. In three other persons, bony structures completely obscured the areas where minimal disease was seen to exist in 1945, but since all of these lesions are now fibro-calcific in character, they presumably were present in 1943. This is borne out by the fact that one of these cases was known to the health department prior to 1943. These 3 probably would not have been missed had a phototimer been available to give optimum exposure to the earlier films. In the remaining 17 cases the lesions were present but missed by the reader of the 1943 survey films (12 minimal, 4 moderately advanced, 1 noncalcified primary). Two of the moderately advanced cases showed evidence of spread in this 18-month period and 1 minimal had retrogressed somewhat. A description of the films of these cases is given in appendix B.

From the above discussion, it is evident that a partial correction can be made of the findings of each survey. This may be done by subtracting from the number of cases found at the conclusion of each survey (83 in 1943; 78 in 1945), the number of persons diagnosed erroneously as tuberculous (6 in 1943; 0 in 1945), and adding the

number of persons whose tuberculous lesions were missed (20 in 1943; 10 in 1945). Accordingly, the adjusted number of cases in 1943 is 97 ( $83-6+20$ ) and in 1945 is 88 ( $78-0+10$ ). The corrected prevalence rates are 1.5 percent for both years. These adjustments do not alter significantly the distribution of cases by stage of disease, increasing the minimals to 70.0 percent of the 1943 total and to 64.8 percent of the 1945 total.

TABLE 4.—*Correction of results of surveys held in November 1943 and May 1945 for "missed" cases of tuberculosis and changed diagnoses*

Type of lesion	Survey, November 1943				Survey, May 1945		
	Number with specified diagnosis at completion of survey	Number diagnosed tuberculous in 1945 but missed in 1943	Number with diagnosis changed to non-tuberculous as result of 1945 survey	Corrected number of cases	Number with specified diagnosis at completion of survey	Number diagnosed tuberculous in 1943 but missed in 1945	Corrected number of cases
	(1)	(2)	(3)	(4)=(1)+(2)-(3)	(5)	(6)	(7)=(5)+(6)
Minimal.....	57	15	4	68	48	9	57
Moderately advanced.....	21	4	1	24	23	1	24
Far advanced.....	2	—	—	2	3	—	3
Stage unknown.....	2	—	—	2	1	—	1
Silico-tuberculosis.....	2	—	1	1	2	—	2
Pleurisy with effusion.....	1	—	—	1	1	—	1
Noncalcified primary.....	—	1	—	1	1	—	1
Total.....	83	20	6	97	78	10	88

#### Prevalence of Tuberculosis Among New Employees

Another point of importance on a resurvey is how much tuberculosis exists among new employees, i. e., persons hired between surveys. The number of new employees was 1,284, or 24 percent of the total persons examined in 1945. Among these, 17 cases of tuberculosis were found, a rate of 1.3 percent. This is not appreciably different from the prevalence of tuberculosis in the general industrial population of this country. The distribution by stage of disease varied considerably from that found generally; 8, or 47 percent, were minimal; 6, or 35 percent, moderately advanced; 2, or 12 percent, far advanced; and 1, or 6 percent, stage unknown. However, the numbers are too small for this variation to be statistically significant.

#### Number of Cases Previously Known to the Health Department

As mentioned earlier, the primary function of a survey is to discover cases of tuberculosis hitherto unknown. Routinely, therefore, all cases diagnosed on surveys are checked against the registers of the six health districts of this county to determine how many were previously known to the health departments.

Of the 97 cases on the 1943 survey, 19 (20 percent) were previously known, while of the 88 cases on that of 1945 the corresponding number was 53 (60 percent). Of the 1945 cases, 70 were in persons examined on both projects, 17 in new employees, and 1 in the group employed in 1943 but not examined until 1945. In the first group, 34 were known to the health departments as a result of the 1943 survey, 14 by reports from other sources received prior to November 1943, and 1 by an induction station report in March 1944. Among the cases in new employees, 4, or 24 percent, were already on the health department register.

#### Discussion and Summary

This comparison of two surveys of a plant with a relatively stable population, done at an interval of 18 months, has afforded an unusual opportunity to obtain information on several points of value to persons conducting mass surveys.

The first point of importance is that an appreciable proportion of cases of tuberculosis was missed in the routine reading of survey films. By comparing X-rays of persons diagnosed as tuberculous on the 1945 survey with those taken in 1943, it was found that of 97 cases that should have been detected in 1943, 20 or 20.6 percent were missed (1 noncalcified primary, 15 minimal, 4 moderately advanced). Similarly, by checking the films of persons diagnosed as tuberculous in 1943 against those of 1945, it was found that of 88 persons who should have been diagnosed as tuberculous on the 1945 survey, 10 or 11.4 percent were missed (9 minimal, 1 moderately advanced).<sup>6</sup>

Important factors in the erroneous diagnoses of 1943 are believed to be the eyestrain and fatigue involved in reading perforated 35-mm. films with the viewing equipment then available, and the lack of phototiming. These factors did not play a significant part in the 1945 project. On both surveys over 3,000 films were read per week, a rate more rapid than deemed advisable. However, a study (5) currently being made by the Tuberculosis Control Division of the United States Public Health Service indicates that the inter-individual variation in reading all types of chest X-ray films is so great, even when the readers are accepted experts in this field, that the miniature technique or speed of examination may not be as important in missed diagnoses as was once thought.

Nevertheless, the fact that some cases are missed should not make one lose sight of the broader benefits of mass surveys. The broad coverage of the industrial population has revealed many cases which certainly would have remained undetected for variable periods of time.

<sup>6</sup> It should be noted that none of these cases would have come to our attention if this comparative study had not been made, since none of them had developed any symptoms.



There is some evidence in this study that with improved equipment and technique, the percentage of erroneous diagnoses can be lowered appreciably.

Another point of considerable interest is that this study has provided some measure of the incidence of tuberculosis in a group of individuals determined to be nontuberculous by chest X-rays on a given date. Of the 3,981 persons examined on both surveys, 55 are now known to have had tuberculosis in 1943, and 3,926 to have been nontuberculous. In the following 18-month period, 5 or 0.13 percent of this latter group developed reinfection tuberculosis, all in the minimal stage.<sup>7</sup> This corresponds to an annual incidence rate of 0.89 per 1,000. Such a low incidence would indicate that a resurvey at an interval of 18 months of persons previously known to be nontuberculous is of little value as a case-finding procedure.

The prevalence of significant tuberculosis among persons employed after November 1943, did not differ from that found in the general industrial population. These results would seem to indicate that once the tuberculosis status of the employees of a plant has been determined by a mass survey, it would be of value to require routine preplacement examinations of all persons subsequently employed. In this instance, such a procedure would have afforded earlier diagnosis for new employees with tuberculosis and would have given more adequate protection to other persons in the plant since two of the cases in the newly employed group had open tuberculosis and have been hospitalized.

The index of the efficacy of a mass survey as a case-finding instrument is the proportion of cases discovered that were previously unknown to the health department. This method can be used to evaluate the case finding of each survey.

In 1943, 80 percent of the detected cases were unknown, while in 1945 the corresponding figure was 40 percent, only half as high as on the first project. This difference is due almost entirely to the fact that 34 of the cases from the 1945 survey had already been brought to the attention of the health department by the first survey. It is of further interest to note that if preplacement chest X-rays had been required of all persons employed after May 1943, only 22 or 25 percent of the 88 cases on the 1945 survey would have come to the attention of the health authorities for the first time.

The preceding discussion has been limited to an evaluation of resurveys on the basis of case finding. However, there are other factors which are not so readily measured but which undoubtedly are of considerable importance.

<sup>7</sup> None of these cases had any known exposure to tuberculosis within the 5-year period preceding the May 1945 survey. The mother of one (case 814, white male, 45 years) gave a history of tuberculosis, arrested in 1931. However, a recent X-ray of her chest showed no evidence of pulmonary tuberculosis.

The first of these is that interest is stimulated in an industrial hygiene program by providing a valuable health service to employees. Evidence of this is provided by recent statements from plant personnel showing a desire for periodic chest X-ray examination. Not only do the individuals feel such examinations are beneficial to themselves, but they also take the attitude that new employees who have not been X-rayed may be a potential menace to their health.

Following the second survey there were quite a few instances of persons receiving normal reports who took advantage of the facilities of their local health departments (described in a folder enclosed with their reports) to have their families X-rayed. This, and other expressions of approval received both at the clinic and at the plant, indicate that these surveys have brought to the attention of the people of the community the fact that their health department is doing something tangible for their benefit.

After the discussion of the results of these examinations with the plant management, the advisability of a third project was broached. It was realized that in the light of the present study, such a survey in the future would not yield many new cases of tuberculosis. In spite of this, management had indicated that requests from employees might make it advisable that this be done at some time within the next 2 years. Hence, in planning a resurvey a balance must be struck between its limitation as a case-finding activity, and the value attached to this procedure as a demonstration in health education.

#### Acknowledgments

This study was made possible by the unusual interest and cooperation of Mr. J. J. Elwood and his staff at Thompson Products, Inc. We are also greatly indebted to the Anti-tuberculosis League of Cleveland and Cuyahoga County, both for financial aid and for assistance with the health education aspects of these surveys.

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## Appendix A

*Comparative study of films of persons diagnosed as tuberculous in November 1943 and nontuberculous in May 1945*

## CASES MISSED IN 1945

1945 film No.	1943 reading	1945 reading	Findings on review of both films
329	Minimal tuberculosis...	Normal.....	Both films show infiltration in left apex and first interspace. No change.
433	.....do.....	.....do.....	Both films show infiltration in left second interspace. No change.
750	.....do.....	.....do.....	Lesion present in both films. No change.
780	.....do.....	.....do.....	Lesion present in both films. No change.
1287	.....do.....	.....do.....	Lesion obscured by ribs in 1945 film.
1960	.....do.....	.....do.....	Lesion present in both films. No change.
			Lesion present in both films. No change.
2751	.....do.....	.....do.....	Lesion obscured somewhat by neck muscles in 1945 film.
4287	.....do.....	.....do.....	Lesion present in both films. No change.
4820	.....do.....	.....do.....	Do.
			Fibrotic strand obscured by clavicle in 1945 film.
236	Moderately advanced tuberculosis.	.....do.....	Lesion present in both films. No change.
794	Minimal tuberculosis...	Pleurisy, inactive.....	
1639	.....do.....	Emphysematous blebs, both apices.	Rounded density in left fourth interspace. Later films and fluoroscopy showed this to be a patch of pleural thickening.
1997	Suspected silicosis infection.	Silicosis.....	Small rarefactions, both apices, with infiltration. Sputa negative. Probable localized emphysema.
2040	Minimal tuberculosis...	Calcified.....	No evidence of coalescence of nodules, other signs of infection.
			Typical primary complex with calcified nodule in left second interspace and associated with calcified node in left upper hilum.
2228	Moderately advanced tuberculosis.	Marked emphysema....	Mottled markings throughout both lung fields. Sputa negative. Probable generalized emphysema.
2818	Minimal tuberculosis...	Emphysematous blebs, both apices.	Small rarefactions, both apices, with no infiltration. Sputa negative. Probable localized emphysema.

## Appendix B

*Comparative study of films of persons diagnosed as nontuberculous in November 1943 and tuberculous in May 1945*

## NEW CASES

1943 film No.	1943 reading	1945 reading	Findings on review of both films
425	Normal.....	Minimal tuberculosis...	1943 film normal; 1945 film shows fibro-calcific minimal disease.
525	.....do.....	.....do.....	Do.
814	.....do.....	.....do.....	1943 film normal; 1945 film shows soft minimal disease. Hospitalized after 1 month's observation.
3863	.....do.....	.....do.....	1943 film normal; 1945 films show apparently inactive minimal disease.
3941	Calcified primary.....	.....do.....	1943 film shows calcified Ghon complex. 1945 film shows soft infiltration peripheral to area where Ghon tubercle was seen in 1943. Only a linear scar can be seen in 1945 where Ghon tubercle was seen in 1943.

*Comparative study of films of persons diagnosed as nontuberculous in November 1943 and tuberculous in May 1945—Continued*

POSSIBLE NEW CASES, BUT PROBABLY MISSED IN 1943

1943 film No.	1943 reading	1945 reading	Findings on review of both films
478	Normal.....	Minimal tuberculosis...	1943 film is slightly underexposed. This is sufficient to obscure fibrocalcific inactive disease found in 1945. In 1943 left clavicle completely covers area where fibrocalcific disease was seen in 1945.
2539	....do.....	....do.....	

CASES MISSED IN 1943

4499	Normal.....	Moderately advanced tuberculosis.	1943 film shows minimal lesion. In 1945 there has been some spread on the contralateral side.
5793	....do.....	....do.....	
3847	....do.....	Minimal tuberculosis...	1945 film shows slight retrogression disease as compared to 1943 film.
3776	Calcification.....	Noncalcified primary....	
386	Normal.....	Minimal tuberculosis...	1945 film shows fibrocalcific strand, apparently obscured by clavicle in 1943 film. Known to health department as case of tuberculosis prior to 1943 survey.
2206	....do.....	....do.....	
2342	....do.....	....do.....	Lesion is present in 1943 film; 1945 film shows no change.
2766	Calcification.....	....do.....	
2969	Normal.....	....do.....	Do. Both films show fibrocalcific infiltration in left mid-lung field.
3359	....do.....	....do.....	
3822	Calcified primary	....do.....	Lesion is present in 1943 film; 1945 film shows no change.
4067	Normal.....	....do.....	
4327	Inactive pleurisy.....	....do.....	Do. Both films show fibrocalcific disease in right apex, in addition to a calcified primary complex in right third interspace.
4973	Normal.....	....do.....	
5607	....do.....	....do.....	Round lesion seen faintly in both films, obscured somewhat by ribs in 1943 film.
?	....do.....	....do.....	
1486	Cervical rib.....	Moderately advanced tuberculosis.	Very slight infiltration in right first interspace in both films. Pleural changes not evident in 1945.
5644	Normal.....	....do.....	

Lesion is present in 1943 film; 1945 film shows no change.

Lesion is present in 1943 film; 1945 film shows no change. Case known to health department prior to 1943 survey.

1943 film could not be located. However, clinic film of Jan. 25, 1944, shows minimal tuberculosis, fibrocalcific in nature, which has shown no change to the present time.

Fibrocalcific disease seen in both films. Known to health department prior to 1943 survey.

Fibrocalcific disease seen in both films. No change. Known to health department prior to 1943 survey.

## MINIATURE PHOTOFLUOROGRAPHY OF THE CLOTHED SUBJECT<sup>1</sup>

By IRA LEWIS, *Surgeon (R), United States Public Health Service\**

The practical advantages in time saved, confusion avoided, and efficiency gained from the examination of clothed subjects in mass X-ray procedures are obvious and desirable,<sup>2</sup> provided, of course, that such practice produces a quality of result equal to that which has been realized by the conventional examination of unclothed subjects.

Radiologists of the Tuberculosis Control Division, United States Public Health Service, have interpreted, in the course of their duties throughout the country, tens of thousands of miniature films of clothed subjects. Such experience permits the persistent belief that clothing causes no diagnostic loss through obscuration. Moreover, since controlled tests to demonstrate the analogous quality of product of the two procedures had never, to our knowledge, been performed, there could be no certainty that some significant lesions did not escape the scrutiny of the observer.

This paper, therefore, is a consequence of a study which was designed to test the practicability of X-ray examination of clothed subjects by comparing films of clothed subjects with films of the same subjects unclothed. The latter were used as the standard against which the former were compared, and, at the outset, an attempt was made to determine the percentage of error present in the films of clothed subjects. That no such percentage was derivable at the conclusion of the study is emphatic indication of the significance of the ensuing observations.

Because examining thousands of persons twice, first clothed, then unclothed, or the contrary, would have been an unwieldy and interminable procedure, an economical method,<sup>4</sup> equivalent in kind and consequence to dual examination, was planned in advance and subsequently followed. A photofluorographic installation was utilized, and all persons who presented themselves for examination were stripped to the waist. Those persons whose miniature films exhibited shadows suggestive of minimal tuberculosis were advised to return for reexamination by means of 14" x 17" films. Upon the return of these positive minimals, another miniature film was also taken, this time with the subject clothed. The second miniature film could then be compared with the first miniature film, and the 14" x 17" film served as a basis for a final evaluation of all analogical judgments. This method made it unnecessary to examine large numbers of normals, both clothed and unclothed.

\* From the Tuberculosis Control Division.

<sup>1</sup> Medical Officer in Charge, Radiology Section.

<sup>2</sup> Comstock, G. W.: *Faster Mass Surveys*. Nat. Tuberc. Assoc., Bull. (February 1946).

<sup>4</sup> This method was suggested by Dr. Russell Morgan, Associate Professor of Roentgenology, University of Chicago.

When the persons who had positive films returned for re-examination and were prepared for their second miniature films, they retained their normal attire but were instructed to detach all removable metallic objects from their upper garments. However, it was observed later that all manner of opaque and semi-opaque objects, such as spectacles, fountain pens, pencils, and costume jewelry, were projected as well-defined shadows on the film. Fortunately, these objects obscured no lesion. Because such large numbers of opaque materials were present in the films, this study is unusual in that no small lesion was obscured. To be sure, when there is any question about the size of the opaque object, the film on which it appears should be retaken. Most buttons are on the mid-line and do not interfere with diagnosis in the pulmonary parenchyma, and projected shadows of other opaque objects can be recognized for what they are, after brief experience in reading such films, and misinterpretation can be avoided. In this study the fabrics worn by the subjects were not of sufficient density to obscure, to any appreciable extent, the lung fields. It is possible that synthetic fabrics, which in time will be used with increasing frequency, may prove to be additional obscuring factors, and a study of them will be necessary.

During the course of this study, 100 additional persons, selected at random, were examined, at first with clothes on, then with clothes off. This precaution was taken as a control device to prevent overscrutiny of any film of a clothed subject by the examiner whose pre-knowledge might incline him to study any given film of a clothed subject until he had perceived the lesion which he knew would be present. The group of 100 random subjects was included so that the test group could not be individually identified. This process was in operation for many months and, as a result, 69 patients whose films delineated shadows suggestive of minimal tuberculosis and many others who exhibited nontuberculous pathology were thus examined. Since 1.2 percent of the population shows X-ray evidence of tuberculosis (all stages) as discovered in mass X-ray surveys throughout the Nation, and since 70 percent of this group has characteristic minimal tuberculosis, the examination of 69 persons whose films exhibited X-ray evidence of minimal tuberculosis would produce results similar to those obtained from the examination of 8,200 persons at random.

At the conclusion of the processing of the films that gave evidence of minimal lesions and the controls, all the films were read by the author in a routine manner, without knowledge of whether the subjects had been clothed or unclothed when the films were taken. All positive diagnoses were tallied according to the location and extent of pathology. These tallies were tabulated and then checked against the original report which had been made when the subject had returned for his second film clothed. The identifying number of both films, clothed

and unclothed, had been entered on this original report and not seen until the films had been reviewed. Finally, each positive was checked individually against the original report, and the films of each person, both clothed and unclothed, were inspected simultaneously and qualitatively compared. It was apparent that the quality of the two types of films was similar.

The findings were as follows: Of 69 cases that exhibited shadows suggestive of minimal tuberculosis on films taken of unclothed patients, 66 were again reported on films taken of the same patients clothed. A restudy of the three instances of apparently inconsistent readings revealed, in one, a shadow which had been interpreted as a lesion in the film which had been taken when the patient was unclothed. This shadow proved to be an artifact which was not perceivable either on the 14" x 17" retake or on the second miniature film which had been taken when the patient was clothed. The other two films were underexposed on the miniature retakes of the clothed patients. Both exhibited apical lesions. No phototimer was available, and the technician had not estimated accurately the exposure factors. In consequence, the apices were poorly demonstrated.

It is significant that in this group of representative cases the wearing of clothing did not impair diagnostic efficiency. Precision in exposure techniques and processing would doubtless have prevented the occurrence of the three questionable films. The use of a phototimer would have eliminated exposure-technique difficulties.

It should be said that this method of examining clothed persons is recommended only for mass X-ray surveys. After detection of the lesion by survey methods, the identification of the pathology by the radiologist requires additional X-ray examination of the disrobed patient.

#### Conclusion

There is no objection to clothed persons in chest survey programs. Speed of operation is increased; less dressing-room space and personnel are required. This method, moreover, will appeal to women and will attract greater numbers of persons to photofluorographic installations with the resultant accelerated action toward the objective of mass surveys—the X-raying of every adult in the United States. Because of these many new examinees and because thousands of new cases of tuberculosis would be brought to medical attention, this method of X-raying clothed subjects, even if productive of a narrow margin of error, would be the procedure of choice. Furthermore, it is reasonable to assume that factors other than clothing, such as technical faults and subjective error inherent in film interpretation, might well introduce greater diagnostic deviation.

REHABILITATION<sup>1</sup>

"Rehabilitation should be considered as an essential part of the treatment of tuberculous persons." To put this bluntly: no scheme which undertakes the treatment and care of a tuberculous person can be considered to be effective until each and every patient is secured in an environment, a scheme of life, a way of living, call it what you may, where he or she can enjoy security, medical, economic, and sociological, upon which treatment depends in so many cases for a permanent result.

"This philosophy is no mere refinement of academic thinking," the Medical Research Council states without hesitation "the introduction of satisfactory arrangements for the industrial rehabilitation of the tuberculous is one of the most pressing needs for the control of this disease."

"The entry of a new ally into the combat is, I feel sure, an immediate response to the urgency of our needs. The Ministry of Labour's plans, and all those responsible for bringing them about, deserve the congratulations and thanks of everyone engaged in the combat against tuberculosis.

"The next step, and the first purpose of this discussion, is to adopt a set of practical proposals and urge both the Ministries of Labour and Health to make it possible for them to be put into successful practice. In other words, how can the Ministry of Labour and the Local Authority work best together for the end we have in view?

"First, the legislative measure which has brought the Ministry of Labour into the field of tuberculosis requires underlining and linking up with the Act which commits the care of the tuberculous to the Local Authority. The philosophy of the Medical Research Council should reach the local authorities through the statute books. If the wording of the act now requires accommodation and treatment to be available to tuberculous persons, it should now be expanded; for we require all responsible authorities to rehabilitate tuberculous persons.

"Secondly, such authority should be accompanied by an outline plan of how it can best be done; and this is what we are here to advise. The Medical Research Council's Report hinted that 'Industries might be set up in connection with certain of the larger well-equipped sanatoria.' These words contain the germ of successful action; but I wish they read as follows: 'Industries might be set up in connection and in close cooperation with not only the larger and better of our sanatoria, but with every single sanatorium in the country.' Every single treatment scheme in the country must be geared together, so that full active modern treatment is followed without break by trans-

<sup>1</sup> From a discussion by Peter Fraser in *Pathways in Aftercare*, National Association for the Prevention of Tuberculosis, Verbatim Report of Discussion held by the National Association for the Prevention of Tuberculosis at the London School of Hygiene, July 11, 1945, pp. 11-16.



fer to a rehabilitation unit which has available the necessary medical team for post treatment, after-care, and facilities for training and employment; and these rehabilitation units must in turn be linked with more powerful units where permanent employment and housing are available on the same level of medical care to the end.

"Groups of local authorities must merge their interests together, the Ministry of Labour has provided a focus upon which they can now converge with assurance. Therefore, the amendment of powers in the hands of local authorities should include not only the responsibility to rehabilitate but indicate the most successful method of doing so.

"Firstly, for every reason, allow their sanatorium superintendents and tuberculosis officers to merge together into regional teams. I have an idea that a higher level of modern treatment might then permeate the whole group; and much more important, such a group could evolve with much greater ease the exact figures of additional accommodation needed both for treatment beds and for rehabilitation accommodation. Agreement upon geographical siting could follow, and interregional cooperation set up to agree and merge together for the permanent employment centers. In all this, the medical teams can now rely not only upon the huge machine of the Ministry of Labour, but also of existing rehabilitation centres who are offering combined services in varying degrees and who only await the word to expand their schemes to meet the various needs of the country as a whole.

"For instance, Papworth alone is able to offer, this very day, employment facilities for a minimum of 500 more tuberculous persons. If the various groups of regions care to make use of these facilities, the necessary expansion of all forms of accommodation, both active treatment, rehabilitation, full employment and housing, will be the only halt between the indication and the reality. Enham can do the same, making a minimum of 1,000 more tuberculous persons over and above our present capacity. Other centers can no doubt do the same in varying degrees.

"Turning again to the most modern of our sources of stimulus, the Medical Research Council's Report, whose proposal should be studied with care. They have two suggestions: First, the setting aside of part of an existing factory with hostel, homes and a night sanatorium nearby for accommodation. Secondly, to take advantage of many small garage businesses which have been converted in this war into light engineering shops and use them as self-contained factories on the model of the Spero workshops.

"Now for the first suggestion: That part of an existing factory be set aside and a system of night sanatoria, hostels and homes be linked up with it. This is no novelty, those who have read that delightful

autobiography of Mr. Henry Ford will recall that there were usually a thousand tubercular employees on the company's pay roll, in a specially constructed shed, working on salvage. That was twenty-five years ago. In California today, at one of the Boeing Flying Fortress plants the graduated employment of the ex-patient has been part of the company's wartime labour policy. There are, therefore, leaders in this field. But for general use I am doubtful of complete success. Quite recently an association of companies published a report indicating the use to which various machines could be put. Each standard machine was listed and those most suited for various categories of disablement indicated; some could be operated by amputated leg cases, some amputated arms, some blind, and so on. At the very bottom of the list there was a little note to this effect: 'some opportunities for tuberculous persons also, such as gate keepers, groundsmen, etc.' Yes, at the bottom of the list comes the tuberculous. The report would have been of no further interest if I had not noticed that every single machine in that list has been installed in one or other of the Papworth workshops, and operated by ex-patients with great success for many years.

"The lesson to be learnt is, I think, that tuberculosis presents to the employer the greatest difficulty of all forms of disablement. First, because of the latent fear of infection which causes many a good man to conceal his condition even from the doctor as well as his fellow men; secondly, because the provision of a competent medical officer and accommodation is more than most companies can afford. This is not because their hearts are not willing, necessarily, but they are most uncertain of success.

"The link up of home, hostel and night sanatorium is essential; but instead of setting aside a portion of an existing factory, I would suggest the setting aside of a process of manufacture. Rollier has done this in Switzerland. When I visited him last in 1937 his patients were assembling the valve gear of gas masks and prior to that, fuses for the State railways.

"Another method is for one or several of the many trade associations of manufacturers to commute as a group their quota or a portion of it by an undertaking to sub-contract a percentage of their annual sales to a fully integrated factory, doing its manufacturing job from start to finish. Financed by the Disabled Persons Corporation in part or whole the Association might well take a pride in a subsidiary firm which not only serves their own requirements, but also represents a corporate enterprise of national value.

"If Papworth can save the community £25,000 per annum, as we do every year, and substitute a purchasing power of £50,000, then I suggest that a very considerable burden may be taken off the shoulders of the community by expansion on the lines indicated.

"Just before the war, tuberculosis was costing a minimum of £4,000,000 net each year. For every case that died, more than two more were found. For every known case we had just £15 to spend per annum; and less than one-tenth of a bed for his or her treatment. And the loss of purchasing power to the country caused by this disease could not have been less than £1,000,000, and in production not less than £100,000,000."

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED JUNE 15, 1946

#### Summary

A total of 184 cases of poliomyelitis was reported, as compared with 161 last week and 96 for the corresponding week last year. States reporting currently 6 or more cases are as follows (last week's figures in parentheses): *Increases*—Illinois 6 (4), Georgia 6 (1), Kentucky 6 (0), Alabama 25 (15), Oklahoma 10 (2), Texas 39 (35), Colorado 10 (5); *decreases*—Florida 25 (33), California 14 (15). States reporting 20 or more cases each during the past 4 weeks (aggregating 392, or 69 percent of cases for the period) are as follows: Florida 111, Alabama 66, Louisiana 20, Texas 123 (last year 120), Colorado 23, California 49. Both the total for the current week and the total for the year to date (1,381), are in excess of the respective corresponding figures for any of the past 11 years.

A total of 6 cases of smallpox, as compared with 4 last week and a 5-year median of 11, was reported during the week—2 in Indiana and 1 each in Kansas, Idaho, Colorado, and California. No new case has been reported in the past 2 weeks in Washington. The cumulative total is 242, as compared with 235 for the same period last year and a 5-year median of 542.

The total of 19,261 cases of measles, as compared with 25,041 last week and a 5-year median of 12,480, is more than reported for the corresponding week in any of the past 4 years. The cumulative figure is 586,748, as compared with a 5-year median of 485,042.

The total of 256 cases of diphtheria, as compared with 229 last week, and the total for the year to date (7,981), are above the respective corresponding figures since 1939.

Deaths registered during the week in 93 large cities of the United States totaled 8,782, as compared with 9,171 last week, 8,291 and 8,849, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,544. The cumulative figure is 231,370, as compared with 225,453 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 15, 1946, and comparison with corresponding week of 1945 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941- 45	Week ended—		Median 1941- 45	Week ended—		Median 1941- 45	Week ended—		Median 1941- 45
	June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945	
NEW ENGLAND												
Maine.....	6	0	0	-----	-----	-----	244	-----	155	1	0	0
New Hampshire.....	0	0	0	-----	-----	-----	37	-----	10	0	0	0
Vermont.....	1	1	0	-----	-----	-----	192	49	74	0	0	0
Massachusetts.....	9	3	2	-----	-----	-----	2,239	359	851	1	6	6
Rhode Island.....	0	1	1	-----	26	1	170	7	14	0	0	1
Connecticut.....	2	0	0	-----	2	2	461	99	246	0	1	1
MIDDLE ATLANTIC												
New York.....	20	19	13	15	11	11	2,931	200	1,028	10	18	18
New Jersey.....	6	3	2	4	1	2	1,898	73	547	5	5	6
Pennsylvania.....	6	5	5	-----	1	1	1,484	562	562	6	6	6
EAST NORTH CENTRAL												
Ohio.....	9	7	3	2	9	9	634	90	318	3	5	5
Indiana.....	6	5	2	1	2	3	152	12	58	2	3	3
Illinois.....	4	5	11	1	1	2	345	352	352	6	14	14
Michigan <sup>1</sup> .....	5	15	5	2	3	1	501	213	285	2	6	6
Wisconsin.....	6	2	1	17	6	13	1,723	66	1,136	1	4	1
WEST NORTH CENTRAL												
Minnesota.....	6	1	1	2	-----	-----	83	11	146	3	3	3
Iowa.....	5	4	2	-----	-----	-----	106	55	130	1	3	0
Missouri.....	5	6	2	-----	3	1	143	34	67	1	5	5
North Dakota.....	0	3	1	-----	-----	-----	6	2	17	0	0	0
South Dakota.....	1	0	0	-----	-----	-----	4	6	16	2	0	0
Nebraska.....	0	2	1	-----	1	1	65	13	25	1	0	0
Kansas.....	9	8	3	12	9	3	69	65	112	1	6	4
SOUTH ATLANTIC												
Delaware.....	0	1	0	-----	-----	-----	5	1	4	0	0	0
Maryland <sup>2</sup> .....	11	15	3	-----	2	2	633	25	116	4	2	6
District of Columbia.....	0	0	0	-----	-----	-----	127	2	74	1	1	1
Virginia.....	5	4	4	60	41	41	514	16	152	2	7	6
West Virginia.....	2	3	2	7	3	3	37	17	32	0	2	2
North Carolina.....	9	6	5	-----	-----	-----	188	26	251	0	5	5
South Carolina.....	1	3	6	95	112	112	221	17	74	0	1	1
Georgia.....	5	4	4	3	-----	4	56	5	30	2	1	1
Florida.....	4	1	1	2	-----	3	100	12	56	0	1	1
EAST SOUTH CENTRAL												
Kentucky.....	4	2	2	-----	-----	1	126	67	56	3	2	2
Tennessee.....	6	2	1	6	13	13	103	30	62	7	6	3
Alabama.....	3	3	2	14	10	14	112	7	45	2	0	1
Mississippi <sup>2</sup> .....	3	8	3	-----	-----	-----	-----	-----	-----	0	3	1
WEST SOUTH CENTRAL												
Arkansas.....	1	2	3	8	3	5	75	39	46	0	0	0
Louisiana.....	9	6	2	9	2	2	117	9	19	11	2	2
Oklahoma.....	4	6	2	15	2	4	124	11	45	1	2	1
Texas.....	33	31	21	235	336	237	779	320	327	8	3	4
MOUNTAIN												
Montana.....	1	2	1	-----	6	1	104	4	38	0	1	0
Idaho.....	2	0	0	15	-----	-----	34	1	5	0	0	0
Wyoming.....	2	0	0	-----	-----	1	37	4	31	0	0	0
Colorado.....	10	3	6	5	42	20	204	4	94	0	1	1
New Mexico.....	0	3	2	3	3	-----	39	11	11	1	0	0
Arizona.....	4	12	1	18	25	26	127	16	30	2	0	0
Utah <sup>2</sup> .....	0	0	0	-----	-----	-----	164	136	79	0	0	0
Nevada.....	0	0	0	-----	-----	-----	3	1	10	0	0	0
PACIFIC												
Washington.....	7	5	4	-----	1	1	82	99	158	1	1	1
Oregon.....	1	2	2	-----	2	6	166	57	79	0	1	1
California.....	23	20	16	10	20	40	1,497	1,075	1,075	6	6	6
Total.....	256	234	154	551	688	688	19,261	4,280	12,480	97	133	133
24 weeks.....	7,981	6,349	6,051	187,067	65,147	77,305	586,748	83,539	485,042	3,798	5,153	5,153

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended June 15, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945	
NEW ENGLAND												
Maine.....	0	0	0	24	30	18	0	0	0	2	0	1
New Hampshire.....	0	0	0	9	7	3	0	0	0	0	0	0
Vermont.....	0	1	0	0	14	4	0	0	0	0	0	0
Massachusetts.....	0	0	0	118	316	254	0	0	0	7	9	2
Rhode Island.....	0	0	0	2	24	9	0	0	0	0	0	0
Connecticut.....	0	2	0	33	42	42	0	0	0	2	0	0
MIDDLE ATLANTIC												
New York.....	4	10	3	355	563	288	0	0	0	1	3	5
New Jersey.....	2	2	1	124	88	88	0	0	0	0	1	1
Pennsylvania.....	3	2	2	193	308	186	0	0	0	6	2	6
EAST NORTH CENTRAL												
Ohio.....	3	1	0	165	190	170	0	1	1	2	1	4
Indiana.....	3	3	0	21	23	23	2	0	0	0	2	2
Illinois.....	6	0	0	112	202	100	0	0	1	1	0	5
Michigan.....	1	0	1	146	233	129	0	0	0	1	0	1
Wisconsin.....	0	1	0	79	153	110	0	4	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	1	0	0	39	45	45	0	1	1	0	0	0
Iowa.....	3	0	0	27	25	21	0	0	0	0	0	0
Missouri.....	0	0	0	21	38	25	0	0	0	1	0	2
North Dakota.....	0	0	0	0	14	3	0	0	0	0	0	0
South Dakota.....	0	0	0	3	5	5	0	0	0	0	0	0
Nebraska.....	1	0	0	6	34	14	0	0	0	0	0	0
Kansas.....	4	0	1	19	49	26	1	1	0	1	0	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	2	2	4	0	0	0	0	0	0
Maryland.....	0	0	0	31	92	60	0	0	0	0	0	1
District of Columbia.....	0	0	0	7	25	10	0	0	0	1	0	0
Virginia.....	0	3	2	24	49	12	0	0	0	2	2	3
West Virginia.....	2	2	0	15	27	13	0	0	0	0	0	3
North Carolina.....	3	2	0	33	40	11	0	0	0	1	0	4
South Carolina.....	0	7	1	5	2	2	0	0	0	2	3	5
Georgia.....	6	2	0	3	10	9	0	2	0	5	10	10
Florida.....	25	0	1	5	5	1	0	0	0	3	4	4
EAST SOUTH CENTRAL												
Kentucky.....	6	0	0	11	24	23	0	0	0	2	7	5
Tennessee.....	0	3	1	14	33	17	0	0	1	5	6	3
Alabama.....	25	8	1	10	18	7	0	0	0	1	4	4
Mississippi.....	4	0	0	5	3	2	0	0	0	2	3	3
WEST SOUTH CENTRAL												
Arkansas.....	2	1	2	2	10	4	0	0	0	0	11	5
Louisiana.....	3	1	2	3	14	3	0	0	0	7	6	7
Oklahoma.....	10	0	0	3	4	6	0	0	0	2	1	1
Texas.....	39	37	4	26	49	21	0	0	0	10	17	15
MOUNTAIN												
Montana.....	0	0	0	2	13	9	0	0	0	1	0	0
Idaho.....	0	0	0	4	9	7	1	0	0	4	1	0
Wyoming.....	0	0	0	0	3	7	0	0	0	2	0	0
Colorado.....	10	0	0	39	28	22	1	0	0	1	0	1
New Mexico.....	2	0	0	7	6	4	0	0	0	3	1	1
Arizona.....	0	0	0	3	9	9	0	1	0	1	3	2
Utah.....	0	2	1	6	4	8	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	1	0
PACIFIC												
Washington.....	2	0	0	20	43	21	0	1	0	0	3	0
Oregon.....	0	1	0	12	18	18	0	0	0	1	2	2
California.....	14	5	6	133	303	129	1	0	0	2	3	3
Total.....	184	96	71	1,822	3,246	2,031	6	11	11	82	106	117
24 weeks.....	1,379	999	657	79,409	123,662	89,533	242	235	542	1,350	1,507	1,900

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 6; Missouri 1; Georgia 2; Florida 1; Kentucky 1; Tennessee 1; Louisiana 1; Texas 4; New Mexico 1.

Telegraphic morbidity reports from State health officers for the week ended June 15, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended June 15, 1946							
	Week ended—		Median 1941-45	Dysentery			En- ceph- alitis, infectious	Rocky Mt. spot- ted fever	Tula- ræmia	Ty- phus fever, en- demic	Un- du- lant fever
	June 15, 1946	June 16, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	14	44	22								
New Hampshire.....		3	3								
Vermont.....	12	17	17								1
Massachusetts.....	132	178	178								1
Rhode Island.....	23	14	20		1						
Connecticut.....	33	39	44								
MIDDLE ATLANTIC											
New York.....	98	203	224	13	11		1				7
New Jersey.....	152	130	130		9			2			1
Pennsylvania.....	110	179	198					1			1
EAST NORTH CENTRAL											
Ohio.....	55	121	137					1			2
Indiana.....	35	17	34								1
Illinois.....	102	54	82	4			1	1	1		15
Michigan <sup>1</sup> .....	160	44	169		2						5
Wisconsin.....	105	31	144								9
WEST NORTH CENTRAL											
Minnesota.....	3	12	25								3
Iowa.....	26		12		1						2
Missouri.....	15	15	15			1		1	2		1
North Dakota.....			1								6
South Dakota.....	1	2	3					1			11
Nebraska.....	1	2	11								5
Kansas.....	17	40	40				1		1		
SOUTH ATLANTIC											
Delaware.....	1		1								
Maryland <sup>1</sup> .....	22	69	69			1		2			1
District of Columbia.....	10	11	16					1			
Virginia.....	95	71	92			104		8			4
West Virginia.....	39	16	18					1			
North Carolina.....	105	188	188						1	2	
South Carolina.....	64	61	131		33						
Georgia.....	16	22	22		8			3	2	11	3
Florida.....	35	7	16	1						13	4
EAST SOUTH CENTRAL											
Kentucky.....	24	57	48		1			1			
Tennessee.....	36	54	54		1				6	1	2
Alabama.....	11	44	51						1	10	2
Mississippi <sup>1</sup> .....									1	3	4
WEST SOUTH CENTRAL											
Arkansas.....	5	19	19	1					3		2
Louisiana.....	13	4	4	1			1			6	1
Oklahoma.....	9	10	25	1	3		1				
Texas.....	241	297	297	25	341	24	3			30	16
MOUNTAIN											
Montana.....	6	2	16					1	2		1
Idaho.....	14	3	1								
Wyoming.....	35	9	6								
Colorado.....	24	16	18		1			2	1		
New Mexico.....	21	6	10	3				1			2
Arizona.....	10	4	11			34					1
Utah <sup>1</sup> .....	37	52	52						1		1
Nevada.....											
PACIFIC											
Washington.....	20	14	35								
Oregon.....	28	15	17								1
California.....	91	422	292	2	4				1	1	
Total.....	2,106	2,618	3,721	51	416	164	8	27	23	77	120
Same week, 1945.....	2,618			32	575	70	10	22	13	94	115
Average, 1943-45.....	2,958			34	574	141	8	21	16	73	
24 weeks: 1946.....	45,011			948	8,013	2,874	208	132	423	1,144	2,093
1945.....	80,055			753	10,493	2,760	166	113	376	1,964	2,177
Average, 1943-45.....	67,024		491,802	728	7,757	2,086	231	124	361	1,134	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

Leptosy: Florida, 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended June 8, 1946

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infections, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	46	0	2	0	0	0	0	6
New Hampshire:												
Concord	0	0		0		0	2	0	0	0	0	
Vermont:												
Barre	0	0		0		0	2	0	1	0	0	
Massachusetts:												
Boston	1	0		0	307	0	9	0	22	0	0	14
Fall River	0	0		0	55	0	0	0	2	0	0	1
Springfield	0	0	1	1	86	0	0	0	3	0	0	1
Worcester	0	2		0	324	0	8	0	0	0	0	35
Rhode Island:												
Providence	0	0		0	131	0	0	0	2	0	0	22
Connecticut:												
Bridgeport	0	0		0	1	0	2	0	2	0	0	1
Hartford	0	0		0	16	0	1	0	6	0	0	4
New Haven	0	0		0	74	0	0	0	2	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	9	0		0	30	0	0	0	8	0	0	5
New York	12	1	2	1	823	7	42	2	174	0	2	48
Rochester	0	0		0	89	0	2	0	24	0	0	2
Syracuse	0	0		0	8	0	4	0	8	0	0	1
New Jersey:												
Camden	0	0		0	1	0	1	0	4	0	0	2
Newark	0	0		0	161	0	2	0	17	0	0	28
Trenton	0	0		0	111	0	1	0	1	0	0	3
Pennsylvania:												
Philadelphia	3	0		0	187	0	18	0	44	0	0	19
Pittsburgh	2	0		0	18	4	2	0	16	0	1	8
Reading	0	0		0	6	0	1	0	3	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0		0	13	0	4	0	6	0	0	4
Cleveland	0	0		0	171	1	6	1	32	0	0	10
Columbus	0	0	1	1	7	0	0	0	2	0	0	6
Indiana:												
Fort Wayne	0	0		0	6	0	0	0	0	0	0	
Indianapolis	0	0		1	32	0	6	0	5	0	0	14
South Bend	0	0		0	1	0	0	0	1	0	0	
Terre Haute	0	0		0	20	0	0	0	4	0	0	
Illinois:												
Chicago	1	0		0	145	4	22	0	82	0	0	32
Springfield	0	0		0		0	1	0	0	0	0	2
Michigan:												
Detroit	2	0	1	4	96	1	7	0	50	0	0	52
Flint	0	0		0	1	0	4	0	3	0	0	3
Grand Rapids	0	0		0	117	0	2	0	10	0	0	8
Wisconsin:												
Kenosha	0	0		0	175	0	0	0	1	0	0	
Milwaukee	0	0		0	362	0	9	0	15	0	0	36
Racine	0	0		0	158	0	0	0	5	0	0	2
Superior	0	0		0	3	0	0	0	1	0	0	4
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	13	0	3	0	0	0	0	
Minneapolis	1	0		0	20	0	3	3	9	0	0	
St. Paul	0	0		0	5	0	1	0	18	0	0	3
Missouri:												
Kansas City	0	0		0	3	1	8	0	5	0	0	6
St. Joseph	0	0		0		0	0	0	0	0	0	
St. Louis	0	0	1	0	88	2	6	2	4	0	0	1



## City reports for week ended June 8, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococ- cus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL— continued												
Nebraska:												
Omaha.....	0	0	-----	0	2	0	5	0	3	0	0	-----
Kansas:												
Topeka.....	0	0	-----	0	-----	0	0	0	3	0	0	3
Wichita.....	0	1	1	1	20	0	2	4	0	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	11	3	0	0	0	0	0	-----
Maryland:												
Baltimore.....	11	0	-----	0	510	1	4	0	22	0	0	20
Cumberland.....	0	0	-----	0	-----	0	0	0	3	0	0	-----
Frederick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	1	0	-----	0	137	0	2	0	13	0	0	6
Virginia:												
Lynchburg.....	0	0	-----	0	19	0	1	0	0	0	0	-----
Richmond.....	1	0	1	1	107	0	2	0	6	0	0	7
Roanoke.....	0	0	-----	0	16	0	0	0	1	0	0	-----
West Virginia:												
Charleston.....	0	0	-----	0	2	0	0	0	1	0	0	-----
Wheeling.....	1	0	-----	0	1	0	1	0	0	0	0	10
North Carolina:												
Raleigh.....	0	0	-----	0	3	0	1	0	1	0	0	-----
Wilmington.....	0	0	-----	0	8	0	2	0	0	0	0	1
Winston-Salem.....	0	0	-----	0	5	0	0	0	2	0	0	10
South Carolina:												
Charleston.....	0	0	-----	0	2	0	1	0	1	0	0	2
Georgia:												
Atlanta.....	0	0	-----	0	26	0	0	0	0	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Savannah.....	0	0	1	0	4	0	2	0	0	0	0	1
Florida:												
Tampa.....	0	0	1	0	20	0	3	4	1	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	1	1	0	11	0	5	0	1	0	0	5
Nashville.....	0	0	-----	1	1	1	1	0	2	0	0	1
Alabama:												
Birmingham.....	0	0	-----	0	14	1	3	1	1	0	1	-----
Mobile.....	0	0	-----	0	-----	0	1	1	0	0	1	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	8	0	1	0	1	0	0	-----
Louisiana:												
New Orleans.....	1	0	3	0	13	0	9	4	5	0	0	-----
Shreveport.....	0	0	-----	0	-----	0	5	1	0	0	0	-----
Texas:												
Dallas.....	2	0	-----	0	10	0	0	2	3	0	0	1
Galveston.....	1	0	-----	0	-----	0	0	0	0	0	2	2
Houston.....	1	0	-----	0	2	0	2	0	2	0	1	1
San Antonio.....	0	0	1	0	8	0	5	11	0	0	0	4
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	2	0	3	0	0	0	0	-----
Great Falls.....	0	0	-----	0	21	1	0	0	0	0	0	-----
Helena.....	0	0	-----	0	3	0	0	0	0	0	0	-----
Missoula.....	0	0	-----	0	3	0	2	0	1	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	2	0	0	0	0	0	0	-----
Colorado:												
Denver.....	1	0	1	0	147	0	3	1	14	0	1	10
Pueblo.....	0	0	-----	0	30	0	1	0	1	0	0	1
Utah:												
Salt Lake City.....	0	0	-----	0	80	0	0	1	7	0	0	1

## City reports for week ended June 8, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	3	0	-----	0	31	0	3	0	2	0	0	9
Spokane.....	0	0	-----	0	4	0	2	0	1	0	0	5
Tacoma.....	0	0	-----	0	6	0	0	0	2	0	0	3
California:												
Los Angeles.....	5	0	5	0	180	3	3	4	35	0	1	5
Sacramento.....	0	0	-----	0	45	0	0	0	1	0	0	-----
San Francisco.....	2	0	-----	0	89	4	5	1	15	0	1	1
Total.....	62	5	21	11	5,473	34	261	43	743	0	11	505
Corresponding week, 1945.....	40	-----	30	13	1,920	-----	289	-----	1,307	0	11	677
Average, 1941-45.....	56	-----	36	12	24,299	-----	298	-----	978	2	19	967

<sup>1</sup> 3-year average, 1943-45.

<sup>2</sup> 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: Buffalo 1; New York 2; Chicago 1.

*Dysentery, bacillary.*—Cases: New York 2; Detroit 2; Richmond 1; Charleston, S. C., 11; San Antonio 3; Los Angeles 1.

*Dysentery, unspecified.*—Cases: San Antonio 20.

*Rocky Mountain spotted fever.*—Cases: Washington, D. C., 1; Spokane 1.

*Typhus fever, endemic.*—Cases: Savannah 1; Birmingham 1; Mobile 1; Shreveport 1; Galveston 1; Houston 1; San Antonio 1; Los Angeles 1.

*Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1943, 34,366,400)*

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polymyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	2.6	5.2	2.6	2.6	2,718	0.0	68.0	0.0	105	0.0	0.0	222
Middle Atlantic.....	12.0	0.5	0.9	0.5	664	5.1	33.8	0.9	138	0.0	1.4	55
East North Central.....	2.4	0.0	1.2	3.6	795	3.6	37.1	0.6	132	0.0	0.0	105
West North Central.....	2.0	2.0	4.0	2.0	304	6.0	56.3	18.1	84	0.0	0.0	42
South Atlantic.....	22.9	0.0	4.9	1.6	1,424	6.5	31.1	6.5	83	0.0	0.0	96
East South Central.....	0.0	5.9	5.9	5.9	153	11.8	59.0	11.8	24	0.0	11.8	35
West South Central.....	14.3	0.0	11.5	0.0	118	0.0	63.1	51.7	32	0.0	8.6	23
Mountain.....	7.9	0.0	7.9	0.0	2,129	7.9	71.5	15.9	183	0.0	7.9	95
Pacific.....	15.8	0.0	7.9	0.0	530	11.1	20.6	7.9	89	0.0	3.2	36
Total.....	9.4	0.8	3.2	1.7	833	5.2	39.7	6.5	113	0.0	1.7	77

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended May 18, 1946.*—During the week ended May 18, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		14		136	322	28	23	29	105	657
Diphtheria.....		5	3	15	13	3			1	40
Dysentery, bacillary.....									1	1
Encephalitis, infectious.....								1		1
German measles.....		2		40	34			6	4	86
Influenza.....		4			7	1				12
Measles.....		101	7	597	942	42	102	165	25	1,081
Meningitis, meningococcus.....			1	1	2			1		5
Mumps.....			1	47	661	67	20	43	233	1,077
Poliomylitis.....		1								1
Scarlet fever.....		7	11	56	75	4	4	11	8	176
Tuberculosis (all forms).....		8	1	179	80	10	8	6	90	382
Typhoid and paratyphoid fever.....				1			1			2
Undulant fever.....			1	2	2			1		6
Veneral diseases:										
Gonorrhea.....		25	15	98	134	38	37	69	82	498
Syphilis.....	1	24	9	70	94	13	14	17	65	307
Whooping cough.....		1		51	60	9		9		130

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*India.*—According to a report dated June 7, 1946, cholera is said to be epidemic in Bengal, Bihar, and the United Provinces, India. In one week 1,300 deaths from cholera were reported in Bengal, 2,400 deaths in Bihar, and 1,700 deaths in the United Provinces.

#### Plague

*Egypt.*—For the week ended June 1, 1946, 4 cases of plague were reported in Alexandria and 5 cases were reported in Suez, Egypt.

*Great Britain—Malta.*—For the week ended June 8, 1946, a case of plague was reported in Malta, the first reported case since the week ended March 2, 1946.

*Peru—Lima Department.*—For the month of April 1946, 1 case of plague was reported in Monte Culebra Farm, Carabayllo Valley, Lima Department, Peru.

#### Smallpox

*Morocco (French).*—For the period May 21–31, 1946, 61 cases of smallpox were reported in French Morocco.

#### Typhus Fever

*Bulgaria.*—For the week ended May 18, 1946, 50 cases of typhus fever were reported in Bulgaria.

*Morocco (French).*—For the period May 21–31, 1946, 238 cases of typhus fever were reported in French Morocco.

### DEATHS DURING WEEK ENDED JUNE 8, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 8, 1946	Correspond- ing week, 1945
<b>Data for 92 large cities of the United States:</b>		
Total deaths.....	9, 146	8, 843
Average for 3 prior years.....	8, 780	
Total deaths, first 23 weeks of year.....	221, 544	215, 585
Deaths under 1 year of age.....	648	574
Average for 3 prior years.....	606	
Deaths under 1 year of age, first 23 weeks of year.....	14, 063	14, 122
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67, 206, 152	67, 380, 906
Number of death claims.....	12, 454	13, 256
Death claims per 1,000 policies in force, annual rate.....	9. 7	10. 3
Death claims per 1,000 policies, first 23 weeks of year, annual rate.....	10. 4	10. 9



FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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# Public Health Reports

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A List of Public Health Service Publications—1945





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# Public Health Reports

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## THE TREATMENT OF TRYPANOSOMIASIS WITH p-ARSENOSOPHENYLBUTYRIC ACID

### I. RESULTS IN 319 CASES OF EARLY *TRYPANOSOMA* *GAMBIENSE* INFECTIONS<sup>1</sup>

By HARRY EAGLE, *Senior Surgeon, United States Public Health Service*

Unlike most acid-substituted phenyl arsenoxides (1), (2),  $\gamma$ -(p-arsenosophenyl) butyric acid is an active trypanocidal agent. Its synthesis and chemical properties (3), its toxicity (4), and its marked therapeutic activity in experimental *Trypanosoma equiperdum* infections of mice and rabbits (1) have been described in previous communications from this laboratory (table 1). In further experimental studies, van Hoof, Henrard, and Peel (5), working with *T. gambiense*, and Davey and Scott (6) working with both *T. equiperdum* and *Trypanosoma rhodesiense*, found the trypanosomal species pathogenic for man to be equally susceptible to treatment.

The initial results obtained in the treatment of human cases (7) suggested that it might be possible to cure early cases within 2 weeks or less, and with relative freedom from toxic complications. Particular interest attached to the fact that the compound was active both *in vitro* and *in vivo* against a typical "arsenic-fast" strain of *T. equiperdum* (8), a property confirmed by van Hoof, Henrard, and Peel (5) with a similarly resistant strain of *T. gambiense* tested in both animals and man.

The present communication will deal with 319 human cases of *T. gambiense* infection treated with p-arsenosophenylbutyric acid in the early stages of the disease, before the central nervous system had become involved. These cases have now been followed for sufficient periods of time to permit a reasonably accurate appraisal of the tox-

<sup>1</sup> From the Venereal Disease Research and Postgraduate Training Center of the U. S. Public Health Service, Johns Hopkins Hospital, Baltimore 5, Md., with the active collaboration of the Sleeping Sickness Services of the Belgian Congo, French Equatorial Africa, French West Africa, the Gold Coast, Nigeria, and the Firestone Plantation in Liberia.

TABLE 1.—*Experimental data with respect to toxicity of p-arsenosphenylbutyric acid and therapeutic efficacy in experimental T. equiperdum infections*<sup>1</sup>

## A. TOXICITY

Number of injections	Animal species	Route of administration	Maximal tolerated dose (LD <sub>50</sub> ) (mg./kg.)	LD <sub>50</sub> (mg./kg.)	LD <sub>90</sub> (mg./kg.)
Single injection.....	{Mice..... Rabbits..... Dogs.....	Intraperitoneal..... Intravenous..... Intravenous.....	26 2.8 -----	33 4.5 7.5±	50 7.5 -----

## B. THERAPEUTIC EFFICACY

Animal species	Method of treatment	Total curative dose, mg./kg.		“Chemotherapeutic index”	
		CD <sub>90</sub>	CD <sub>50</sub>	MTD <sup>2</sup> CD <sub>90</sub>	LD <sub>50</sub> <sup>3</sup> CD <sub>50</sub>
Mice.....	Single injection, intraperitoneal.....	1.6	3.4	7.6	20.5
Rabbits.....	Four daily injections, intravenous.....	3.6	6.0	1.3	4.5

<sup>1</sup> After (1).<sup>2</sup> Maximal tolerated dose.

Dose which cures 90 percent.

<sup>3</sup> Dose which kills 50 percent.

Dose which cures 50 percent.

icity and therapeutic efficacy of the compound, as well as the optimum method for its administration. Subsequent papers will consider the far more difficult therapeutic problem presented by advanced cases, with definite involvement of the central nervous system, as well as various types of animal trypanosomiasis, studies which are now in progress.

As is indicated in table 2, the data here reported represent a collaborative effort by the Sleeping Sickness Services of the Belgian Congo, French Equatorial Africa, French West Africa, the Gold Coast, Nigeria, and the Firestone Plantation in Liberia. Some of the cases included in the present report were treated during the writer's first trip to West Africa, in the summer and fall of 1944

TABLE 2.—*Clinics participating in the study on the therapeutic efficacy of p-arsenosphenylbutyric acid in human trypanosomiasis*

Colony	Area of treatment	Number of cases included in present report	Collaborating physicians
Belgian Congo.....	Leopoldville, Mikungu.....	47	{ Gen. L. van Roof, B. Rod-jestvensky, Scallet. Col. Ceccaldi. Lt. Col. L. Nodenot, Col. C. LeRouzic, G. Saunders, Brig. G. M. Findlay. R. B. Kinderman. J. L. McLetchie, C. Hollins, K. E. U. Ground.
French Equatorial Africa.....	Brazzaville.....	41	
French West Africa.....	Bobodioulasso.....	6	
Gold Coast.....	Kintampo, Ejura.....	22	
Liberia.....	Firestone.....	10	
Nigeria.....	Ungwa Rimi, Zegun, Rigachikun.....	193	

(7); the majority were treated subsequently by the several sleeping sickness services, and their histories obtained during a second visit in the summer and fall of 1945. The number of physicians participating in the study precludes their inclusion as coauthors; but the study would obviously have been impossible without their continuing interest and cooperation. With the exceptions discussed in the text, consistent results were obtained in the various colonies. The conclusions here drawn, based on the composite experience, thus differ only in detail from the individual appraisal of the several medical services.

#### Methods and Materials

##### *Drug*

The free p-arsenosophenylbutyric acid is a water-insoluble white compound which dissolves in alkali to form a yellowish solution of the highly soluble sodium salt. The drug was first packaged in glass-sealed ampules as a sterile 2-percent solution adjusted to pH 7.0. After about 12 months, apparently due to an interaction between the sodium salt and an inferior, perhaps acid-treated glass, the pH had dropped to 6.0, and approximately 7 percent of the compound precipitated from the solution as the free acid. Subsequently, the drug was packaged as a stable dry powder in sterile rubber-stoppered vials, each containing 200 mg. of the acid in the form of the sodium salt. This dissolved readily on the addition of 10 cc. of water to form the 2-percent solution usually injected. There is reason to believe that with properly selected glassware, solutions at pH 7.0 to 8.0 will remain stable in glass-sealed ampules.

##### *Method of Administration*

Most of the patients received approximately 0.4 mg. per kg. per injection. In a man of 60 kg. this unit dose was 24 mg., injected as 1.2 cc. of the 2-percent solution. In some clinics, it was found more convenient to use a 0.4-percent solution (4 mg. per cc.) in which case the 24-mg. dose for a man weighing 60 kg. was 6 cc. This average dose of 0.4 mg./kg. was  $\frac{1}{2}$  of the maximum tolerated dose in rabbits,  $\frac{1}{6}$  of the maximum tolerated dose in mice, and promised to afford a reasonable margin of safety (table 1). As is discussed in the text, in one small series of patients, five times that dosage level was administered daily for 8 days, with no demonstrable toxic reaction.

Almost all the patients were injected intravenously. A total of at least 12 patients were, however, injected intramuscularly (gluteal muscles) through the entire course of treatment, with either no reaction, or transitory discomfort at the site of injection.<sup>2</sup> The two modes

<sup>2</sup> The relative freedom from local reaction to this acid-substituted arsenoxide, in contrast to the marked inflammatory reaction following the intramuscular injection of, e. g., neoarsphenamine or mapharsen, is probably referable to the demonstrated lack of affinity between such acid-substituted arsenoxides and mammalian tissue cells (8), (16).

of administration proved equally effective therapeutically, and they are not distinguished in the text.

In order to determine the optimum amount and schedule of treatment, the number of injections was deliberately varied from 7 to 21, and their frequency similarly varied from twice weekly to once daily.

### *Selection of Patients*

The clinical material was not selected with respect to either age or sex. All were natives of widely differing racial stocks. Sixty percent were males. Nine percent were less than 10 years of age, 25 percent were in the 10 to 19 year age group, 65 percent were 20 to 40, and 1.5 percent were 50 years or older. Since the therapeutic results were independent of age and sex, these subgroups are not distinguished in the text.

Fifteen cases treated as early infections are not included in the 319 analyzed. Three died of intercurrent infections (dysentery, cerebrospinal fever, and an unidentified disease) not related to the trypanosomiasis; in 2 no record had been kept of dosage; and in 10 there were no data as to the microscopic or spinal fluid findings on which the diagnosis of trypanosomiasis had been based.

In identifying the cases as "early," i. e., without demonstrable involvement of the central nervous system, the clinical history as to the duration of the infection proved wholly unreliable, as did either the external appearance of the patient or the subjective symptomatology. The clinical material here included therefore comprised 221 cases in whom either the blood, cervical lymph nodes, or both, were shown to harbor trypanosomes, and whose cerebrospinal fluid was normal. Unfortunately, the criteria of a "normal" fluid varied considerably between the various treatment centers. For the purposes of the present study, any patient with less than 10 cells per cubic millimeter, and less than 25 mg. of protein per 100 cc., was arbitrarily adjudged to fall into the "early" group, with a normal fluid; patients with 10 to 20 cells per cubic millimeter were included only if the spinal fluid protein was less than 20 mg. percent; and patients with more than 20 cells were excluded. There were 98 additional cases in whom lymph nodes, blood, or both were positive, who seemed in good clinical condition, and gave no history of a long-standing infection, but who did not have a spinal puncture prior to treatment. It is obvious that a small if indeterminate proportion of these quasi-early cases would have been discovered to have an altered spinal fluid, and thus, asymptomatic central nervous system involvement. For that reason, this group is not comparable to the other 221 cases, and is considered separately in the text.

*Observation of Patients and Criteria of Treatment Failure*

Patients were re-examined at varying periods after the completion of treatment, with particular reference to (a) the presence or absence of trypanosomes in the blood (wet and dry films) and cervical lymph nodes; (b) the cerebrospinal fluid findings; and (c) general clinical condition. The presence of trypanosomes, or abnormal spinal fluid findings, were taken as *prima facie* evidence of treatment failure. More than 80 percent of the patients had a spinal puncture at the time of the last observation indicated in table 6.

There were wide differences among the several medical services as to the degree of change in the spinal fluid findings to be considered indicative of pathologic involvement, and thus, of treatment failure. As ordinarily practiced, a spinal fluid cell count in which one actually scrutinizes no more than 1 mm.<sup>3</sup> of fluid provides a total count with a large statistical error. Thus, an observed count of, e. g., 6 per cubic millimeter, may correspond to an actual count as low as 3, or as high as 12. Under such circumstances, one may properly question the validity of adjudging a case a treatment failure because the cell count had apparently changed from 4 to 8 or even 12. Even if that increase were real rather than apparent, normal variations in the spinal fluid cell count in the same individual are not inconsiderable, and render small changes suspect.

Similarly, in the determination of spinal fluid protein, most of the medical services in Africa use the method of Sicard and Canteloube (cf. (9)). Although it is a simple procedure admirably adapted to use in the field, its accuracy at levels less than 25 mg. percent leaves much to be desired. Even if the results could be taken at face value, there is so much normal variation in spinal fluid protein content that an isolated observation of e. g., 27 mg. percent may have little significance.

Several actual cases which illustrate the error which may be introduced by too hasty an interpretation of the spinal fluid findings are summarized in table 3. Few physicians responsible for the medical care of sleeping sickness would have hesitated to adjudge most, if not all, of these cases as treatment failures, yet all five proved to have a normal fluid when retested months later, without intervening treatment; and they have remained clinically well to the time of the last observation.

In view of the foregoing considerations, 13 cases which were adjudged treatment failures by the attending physician on the basis of minimal changes in the cerebrospinal fluid were not considered as such in the following analysis. The laboratory data in these cases

TABLE 3.—Cases illustrating the fact that even significant alteration in the spinal fluid observed after the completion of treatment for early trypanosomiasis do not necessarily signify treatment failure.

Case No.	Treatment		Spinal fluid findings				
	Total mg./kg.	Date of completion	Date	Cells per cu. mm.	Trypanosomes	Protein content, mg. (percent)	Globulin
L-77-----	3.9	1943 Dec. 29	Nov. 23, 1943 Jan. 11, 1944 Apr. 18, 1944 Aug. 22, 1944 Mar. 13, 1945	11 7 59 8 4	0 0 0 0 0	(?) 40 22 29 22 22	0 0 0 0 0
L-94-----	4.0	1944 Mar. 22	Feb. 22, 1944 Apr. 4, 1944 May 30, 1944 July 12, 1944 Sept. 11, 1945	9 22 27 5 8	0 0 0 0 0	22 40 22 18 22	0 0 0 0 0
L-130-----	3.6	Sept. 11	Aug. 1, 1944 Sept. 19, 1944 Dec. 5, 1944	11 12 9	0 0 0	18 56 22	0 ++ 0
N-754-----	5.1	Oct. 11	Mar. 11, 1945 Sept. 3, 1945	16 8	----- -----	Pandy and neg. 21	Ross-Jones -----
N-773-----	5.5	Oct. 30	Mar. 12, 1945 Sept. 3, 1945	135 5	----- -----	Pandy ± neg. -----	Ross-Jones -----

TABLE 4.—Cases in present series in which minor changes in the spinal fluid cell count or protein content observed after the completion of treatment were adjudged insufficient to establish diagnosis of treatment failure (cf. data of table 3)

Case No.	Treatment		Spinal fluid findings				
	Total, mg./kg.	Date of completion	Date	Cells per cu. mm.	Trypanosomes	Protein content, mg. percent	Globulin
B-29-----	2.8	Jan. 3, 1944	1944 Dec. 22, 1944 Mar. 12, 1945	12 17 2	0 0 0	26 21 22	-----
B-50-----	5.6	Feb. 6, 1945	Jan. 22, 1945 Mar. 16, 1945	2 10	0 0	22 20	-----
B-54-----	5.6	Feb. 12, 1945	Jan. 28, 1945 Apr. 27, 1945	2 12	0 0	23 22	-----
B-58-----	8.0	Feb. 26, 1945	Feb. 6, 1945 June 1, 1945	8 11	0 0	24 27	-----
B-60-----	8.0	Feb. 27, 1945	Feb. 7, 1945 Mar. 19, 1945	3 3	0 0	24 29	-----
B-63-----	4.4	Feb. 26, 1945	Feb. 15, 1945 Mar. 19, 1945	2 6	0 0	22 50	-----
M-45-----	5.7	Mar. 8, 1945	Feb. 22, 1945 Apr. 9, 1945	8 10	0 0	22 22	0
M-47-----	4.7	Mar. 8, 1945	Feb. 22, 1945 Apr. 9, 1945 Mar. 30, 1945	8 12 3	0 0 0	24 22 12	0 0 0
M-66-----	3.0	Apr. 12, 1945	May 8, 1945 July 24, 1945	3 12	0 0	15 10	0 0
M-100-----	5.6	Apr. 27, 1945	Apr. 10, 1945 May 28, 1945	4 8	0 0	20 22	0 0
M-101-----	5.6	Apr. 27, 1945	Apr. 10, 1945 May 28, 1945	2 7	0 0	22 22	0 0
M-102-----	5.4	Apr. 27, 1945	Apr. 10, 1945 May 28, 1945	2 6	0 0	15 20	0 0
M-126-----	6.0	Aug. 6, 1945	July 20, 1945 Sept. 6, 1945	8 12	0 0	22 22	0 0

are given in table 4, and have been held insufficient to establish the diagnosis of relapse. Indeed, on the basis of the data of table 3, one may properly question the significance of far more pronounced changes in the spinal fluid, unless confirmed by a repeat lumbar puncture 2 to 4 months later.

#### *Calculation of Percentages of Cure and Treatment Failure*

The percentage of treatment failure given in tables 6 and 7 was obtained by relating the number of observed failures to the total number of cases treated. This is clearly a minimum figure, since additional relapses will undoubtedly be discovered on longer observation (cf. page 1028). The small number of cases in each group, particularly in the longer observation periods, did not justify the calculation of the cumulative percentage of treatment failure (10). It is, however, estimated that the cumulative percentage of treatment failure will be approximately half again as large as those indicated in table 6.

#### *Clinical Results*

##### *Rate of Disappearance of Organisms from Blood and Lymph Nodes After Treatment With p-Arsenosphenylbutyric Acid*

Eighty-nine patients with trypanosome-positive cervical lymph nodes were re-examined at varying intervals after a single injection of p-arsenosphenylbutyric acid at 0.3 to 0.6 mg. per kg. As is shown in table 5, 88 percent of 25 tested were negative 30 minutes after treatment, 96 percent of 23 tested were negative 45 minutes after treatment, and 91 percent of 11 tested were negative 1 hour after treatment. Those still harboring organisms at the time of the first examination were regularly negative when retested  $\frac{1}{2}$  to 1 hour later.

Seven of these 89 patients had been injected intramuscularly, rather than intravenously. In 6, organisms had disappeared from the nodes within  $\frac{1}{2}$  hour after the first injection; the seventh was positive  $1\frac{1}{4}$  hours after the injection, but negative after 2 hours.

TABLE 5.—*The rate of disappearance of T. gambiense from the cervical lymph nodes after a single injection of p-arsenosphenylbutyric acid at 0.3 to 0.6 mg. per kg.*<sup>1</sup>

Time between treatment and lymph node puncture	30 minutes	45 minutes	60 minutes	6 hours	Controls (untreated)
Number patients tested.....	25	23	11	30	16
Number negative.....	22	22	10	29	2
Number positive <sup>2</sup> .....	3	1	1	1	14

<sup>1</sup> A total of 89 patients were injected and tested at the varying intervals indicated in the table. Of these, 7 were injected intramuscularly rather than intravenously. Six of these were negative when first tested, 30 minutes after the injections. In 22 patients the blood film also contained demonstrable organisms; in all, the blood became negative simultaneously with the lymph node.

<sup>2</sup> In the 4 patients with positive lymph nodes 30 or 60 minutes after treatment, organisms had disappeared on re-examination  $\frac{1}{2}$  to 1 hour later. The case still positive 6 hours after treatment (cf. text) was negative the following morning.



Although 1 of 30 patients examined 6 hours after treatment was still positive at that time, the particular patient was an infant who received only 0.3 cc. of solution, and there may be some question as to the dose actually injected. His gland was negative when re-examined 24 hours after treatment.

Of the 89 patients in the test group, 22 demonstrated trypanosomes in the blood as well. In all 22, the blood had also become negative when trypanosomes had disappeared from the node. In 3 other patients with a positive blood film, but with negative lymph nodes, organisms had disappeared from the blood 30 to 60 minutes after the first treatment.

The rapid disappearance of trypanosomes from the blood and nodes after the injection of a single small dose of p-arsenosphenylbutyric acid is consistent with the marked trypanocidal action of the drug *in vitro*. Depending on the concentration of organisms, dilutions of 1:1,000,000 to 1:20,000,000 had been found to immobilize the organisms in 2 to 4 hours at room temperature, and even higher dilutions were effective in 24 hours (1), (2). These dilutions are of the same order of magnitude as those attained in the body fluids after the injection of 0.4 mg. per kg. body weight.

Only one patient proved to be relatively resistant to the drug. This 30-year-old male (L-146) relapsed (blood film positive) 8 months after completing an adequate course of treatment during which he received a total of 8 mg. per kg. When he was originally treated, organisms had disappeared from the cervical lymph nodes 30 minutes after the first injection of 0.47 mg. per kg. On retreatment, however, organisms disappeared from the blood only after 2 injections of 0.5 mg. per kg. each.

The previously demonstrated activity of the p-arsenosphenylbutyric acid against "arsenic-fast" strains of trypanosomes was confirmed in at least one case of the present series (case L-130 of Dr. L. van Hoof). A 27-year-old male with a trypanosome-positive cervical lymph node was treated with a single massive injection of 6 gm. of tryparsamide on August 8, 1944. On August 10 and again on August 14 persistent motile trypanosomes were demonstrated in the node by puncture. On August 30 he was injected intravenously with 30 mg. of p-arsenosphenylbutyric acid (0.5 mg. per kg.). The lymph node was negative when punctured the next day, and remained negative thereafter. The patient received 6 treatments to a total of 3.6 mg. per kg., and was well when last seen (June 6, 1945).

#### **Toxic Reactions and Maximal Tolerated Dose in Man**

The 319 cases included in the present report received a total of approximately 4,000 injections, with relatively few immediate or

delayed toxic reactions. The characteristic nausea-vomiting reaction so often observed after the injection of arsphenamines or "mapharsen" was conspicuously uncommon, occurring after less than 1 percent of the injections. Extravasations caused some local discomfort, but less than that observed after mapharsen. Twelve patients were injected intramuscularly, with either no reaction or transitory discomfort at the site of injection, and without further complication. The drug may therefore be injected intramuscularly in infants or obese patients in whom intravenous injection is not feasible.

One patient (UR-739) developed urticaria of the face within 30 minutes of the first injection, at 0.45 mg. per kg. This disappeared with no further complications, and there were no reactions to the second or subsequent injections. A second patient (UR-816) developed a painless jaundice after having received a total of 4.7 mg. per kg. in 12 injections over a period of 36 days. This cleared without further complications.

Two patients in the present series of 319 died within a week after the completion of treatment. One of these (UR-766) was not seen by a physician, and the cause of death remains obscure. The second case (B-57) was suspected of being a case of arsenical poisoning, but clinical and laboratory details were meager and inconclusive. Both cases were adults who had received a relatively small amount of treatment (total of 3.5 mg. per kg., at 0.4 mg. per kg. per injection).

Most of the patients received approximately 0.4 mg. per kg. per injection, repeated as often as once daily for as many as 23 injections. As is indicated in table 1, this is  $\frac{1}{8}$  of the maximal tolerated dose on a single injection (intraperitoneal) in mice,  $\frac{1}{4}$  of the maximal tolerated dose (intravenous) in rabbits, and  $\frac{1}{10}$  of the single LD<sub>50</sub> (intravenous) in dogs.

Four patients were injected intravenously at 1.1 to 1.5 mg. per kg., and that same dose was repeated 2 hours later. This total of 2.2 to 3 mg. per kg. was seven to eight times the average single dose used in man, approximately half the maximum tolerated dose in dogs, and approximately equal to the maximum tolerated dose in rabbits. In none of the four patients was there an immediate toxic reaction or subjective discomfort, and they remained well for the remainder of the observation period. An error in dosage provided an even more rigorous test of the toxicity of the compound in man. A group of seven patients was injected in error with approximately 2 mg. per kg. This dose, five times the average injection, was repeated daily for periods varying between 5 and 10 days. There were no immediate or delayed toxic reactions in any of the seven patients.

It follows that cases of early trypanosomiasis can be treated by daily injections of p-arsenosophenylbutyric acid at 0.5 mg. per kg.,

and probably at 1 mg. per kg., with relative freedom from immediate or delayed toxic effects.

**End Results of Treatment: The Minimal Curative Dose**

In table 6, 199 cases known to have had a normal spinal fluid before treatment have been arranged vertically in four groups according to the total amount of p-arsenosphenylbutyric acid received in the course of treatment. Each group has been subdivided horizontally according to the length of time for which the patients have now been under observation. Since only 27 percent of the cases have been followed for 6 months or longer, additional failures will undoubtedly

TABLE 6.—Results in early trypanosomiasis in relation to amount of treatment received

Total treatment with p-arsenosphenylbutyric acid, mg./kg.		Observation period, months							Totals	Failures to date (per cent)	Apparent cures to date (per cent)
		<2	2-4	4-6	6-9	9-12	12-18	18			
<3.5.....	[Number patients followed.....	21	11	7	3	1	-----	-----	43	26	74
	[Number failures.....	5	5	1	-----	-----	-----	-----	11	-----	-----
3.5-4.9.....	[Number patients followed.....	4	2	2	16	4	2	1	31	10	90
	[Number failures.....	-----	-----	-----	3	-----	-----	-----	3	-----	-----
5.0-6.4.....	[Number patients followed.....	15	4	9	8	1	-----	-----	37	8	92
	[Number failures.....	1	-----	1	1	-----	-----	-----	3	-----	-----
≥6.5.....	[Number patients followed.....	11	18	39	5	15	-----	-----	88	5	95
	[Number failures.....	-----	1	2	-----	1	-----	-----	4	-----	-----

<sup>1</sup> In a group of 22 patients treated at this dosage in a single clinic, there were 9 failures (41 percent). As is discussed in the text, this anomalous result, coupled with the fact that 6 of the 9 failures were among the first patients there treated, strongly suggests a systematic error in dosage, a possibility in which the attending physician concurs. This group has been omitted from the table.

be encountered with longer observation. However, present experience indicates that treatment failures are encountered at a diminishing rate<sup>2</sup> after the first 6 months; and the conclusions reached on the basis of the data now available will probably not be appreciably modified by further experience. The error introduced by not calculating the percentage of treatment failure on a cumulative basis has been discussed on page 1025.

1. Of the 43 patients who received a total of less than 3.5 mg. per kg. of drug, 6 have since shown organisms in the blood or lymph nodes, and 5 others had laboratory evidence of central nervous system involvement, a total relapse rate of 26 percent. Thirty-two (74 percent) remain well at the present writing.

2. Of the 31 patients who received a total of 3.5 to 4.9 mg. per kg.,

<sup>2</sup> Most of the failures listed in the 6 to 9 month period were observed in patients then seen for the first time since the completion of treatment. It is probable that some of these would have been apparent had the patient been seen earlier, for instance, 3 months after treatment.

three have relapsed, all with altered cerebrospinal fluid, and 28 (90 percent) have remained well to date.

3. Of a total of 59 patients who received 5.0 to 6.4 mg. per kg., 12 were adjudged treatment failures, 6 with a positive blood film and 6 with alterations in the spinal fluid. This paradoxical result was referable to a single small series of 22 patients treated in a single clinic, no less than 9 of whom (41 percent) relapsed. Six of these relapses were among the first patients there treated. The possibility must be considered, and was seriously entertained by the physician in charge, of a systematic error in dosage with a new and unfamiliar preparation. If this group of 22 patients is omitted from consideration, among 37 patients who received a total of 5 to 6.4 mg. per kg., there have been 3 failures (8 percent), and 92 percent of the cases have remained well.

4. Eighty-eight patients received 6.5 mg. per kg. or more of the compound. To date, there have been four failures (5 percent) in this group, and 84 (95 percent) remain well. It is to be emphasized that almost 60 percent of this most favorable series has been followed for 4 months or more since the completion of treatment.

In considering those results, it is to be noted that the 11 treatment failures observed in 43 cases receiving less than 3.5 mg. per kg. were definite, comprising 6 cases with positive blood smears or lymph nodes, and 5 with indubitable central nervous system involvement. On the other hand, of the 10 treatment failures observed in 156 cases<sup>4</sup> treated at dosages greater than 3.5 mg. per kg. (6.5 percent), in five the objective evidence for relapse consisted solely of an increased spinal fluid cell count (14, 24, 26, 28, and 30 per cubic millimeter), the protein content remaining normal or slightly elevated, and in no case exceeding 30 mg. percent. The lymph nodes and blood in those cases contained no demonstrative organisms, and the patients remained objectively and subjectively well. In one of these cases, the cell count had remained 22 to 26 per cubic millimeter for a period of 6 months. There is thus a possibility that at least some of these patients had not actually relapsed.

Results qualitatively similar to the foregoing were obtained in a second series of 98 patients, considered as early infections despite the fact that spinal puncture was not performed before treatment (table 7). This group therefore included an indeterminate number of cases with asymptomatic central nervous system involvement at the time of treatment (see page 1022). In the 47 such patients treated at 3.5 to 4.9 mg. per kg. there was one failure, a relapse rate of 2 percent, and an apparent cure rate of 98 percent. Thirty-seven of these patients have now been followed for periods of 6 to 12 months after

<sup>4</sup> Omitting a single series of 22 cases in whom anomalous results were obtained perhaps referable to an error in dosage (page 1025).

the completion of treatment, and it is unlikely that a significant number will relapse with longer observation. There was one failure also in 17 cases treated at 5 to 6.5 mg. per kg. Paradoxically, there were no less than five failures in 32 cases treated with more than 6.5 mg. per kg. These supposed treatment failures almost certainly included some cases with central nervous system involvement prior to the beginning of treatment. It is significant that all of the apparent relapses in this series involved alterations in the spinal fluid; while in the known early cases (table 6) 7 of 21 actual or suspected treatment failures were detected by the reappearance of trypanosomes in the blood and glands, with no demonstrable involvement of the central nervous

TABLE 7.—Results in 98 putative cases of early trypanosomiasis (spinal puncture not performed before treatment)

Total treatment with p-arsenosphenylbutyric acid, mg./kg.		Observation periods, months					Totals	Failures to date (percent)	Apparent cures to date (percent)
		<2	2-4	4-6	6-9	9-12			
<3.5	(Number patients followed)	-----	-----	-----	-----	2	2	-----	-----
	(Number failures)	-----	-----	-----	-----	0	0	-----	-----
3.5-4.9	(Number patients followed)	1	1	8	16	21	47	2	98
	(Number failures)	-----	-----	1	-----	-----	1	-----	-----
5.0-6.4	(Number patients followed)	1	1	-----	5	10	17	6	94
	(Number failures)	-----	-----	-----	-----	1	1	-----	-----
≥6.5	(Number patients followed)	5	1	8	18	-----	32	16(?)	84
	(Number failures)	-----	-----	4	1	-----	5	-----	-----

system. This suggests that in at least some of the patients under discussion, the central nervous system may already have been involved at the time of treatment.

In summary, it seems clear from the foregoing considerations and the data of tables 6 and 7 that more than 90 percent of early *T. gambiense* infections can be cured by relatively small amounts of p-arsenosphenylbutyric acid, on the order of 6 to 7 mg. per kg., or a total of 360 to 420 mg. of drug in a man weighing 60 kilograms.

It is of interest to compare this curative dose in man with that observed in experimental animals with this and other species of trypanosome (table 8).

**The Optimum Method of Treatment: Size of Individual Dose, Frequency of Injection, and Total Duration of Treatment**

Of 156 known early cases of trypanosomiasis treated with a total of 3.5 mg. per kg. or more, 146 have remained well to date. If one includes the cases considered as early, but without information as to the spinal fluid findings, there were 252 patients in this category, of whom 235 (93 percent) remain well. Although these cases received comparable total amounts of the drug, the method of administration varied

within wide limits. The majority were given approximately 0.4 mg. per kg. at each injection, but some received as little as 0.25, and others as much as 2 mg. per kg. The total number of injections varied similarly from 3 to 23. Some patients were injected weekly or every 5 days, some twice weekly, some three times weekly, some daily, and some at irregular intervals. The total duration of treatment was from 4 to as long as 70 days. Within these limits of variation the factor determining therapeutic efficiency was solely the total amount of treatment received. Neither the size of the individual dose, nor the frequency of injection demonstrably affected the end results of treatment.

TABLE 8.—*The curative dose of p-arsenosphenylbutyric acid in a variety of trypanosomal infections*

Trypanosomal species	Animal species	Curative dose (CD <sub>50</sub> ) of p-arsenosphenylbutyric acid; mg./kg.	Observer
<i>T. equiperdum</i> ...	Mice .....	3.4..... Arsenic-"resistant" strain equally susceptible.	Eagle, Hogan, Doak and Steinman (1) Eagle and Magnuson (8)
	Rabbits.....	6.8±..... 6.0.....	Davey and Scott (6) Eagle, Hogan, Doak and Steinman (1)
	Guinea pigs.....	4.0..... Arsenic-"resistant" strain equally susceptible.	van Hoof, Henrard and Peel (6)
<i>T. gambiense</i> .....	Man .....	6 to 7.....	Eagle.
<i>T. rhodesiense</i> .....	Mice .....	>3.4..... <6.8.....	Davey and Scott (6)
<i>T. cruzi</i> .....	Rats.....	Temporary disappearance of organisms from blood after injections of 2 mg./kg.; animals not cured by 5 daily injections at that level.	
	Mice.....	No effect with 6.8 mg./kg.....	Davey and Scott (6)
<i>T. congolense</i> .....	Mice.....	No effect with 30 mg./kg..... No effect with 6.8 mg./kg.....	Browning (11) Davey and Scott (6)
<i>T. evansi</i> .....	Mules and horses.	Four of 9 animals still negative 3 weeks after receiving 6 injections at 1.25 mg./kg. each, given every other day. Less intensive treatment regularly ineffective.	Oordy and Kelsner (12)

A similar relationship has already been observed in the treatment of syphilis with arsenicals, both in animals and in man. The curative dose of 3-amino-4-hydroxyphenylarsenoxide (mapharsen, clorarsen, and their analogues) in rabbits was identical, whether administered as a single dose within 15 seconds, or distributed over a period of 6 months (13); and in man also, total dosages of 1,500 mg. had the same effect whether administered in 5 days or over a period of many months (13 b). In human trypanosomiasis, as in syphilis, the organisms apparently multiply so slowly that, even when injections are administered weekly, there is not sufficient regrowth in the interval between injections to affect the total curative dose significantly as compared with injections repeated daily.

(A different relationship has been observed by Swinyard and Wright (14) in experimental trypanosomal infections of rats, in which repeated small subcurative doses of arsenical were the less effective, the longer the time interval between injections. In that animal, however, there is a fulminating and rapidly fatal infection in which the trypanosomes multiply so rapidly that the volume of organisms in the circulating blood sometimes approaches that of the red blood cells. In such case, and unlike the human disease, the total curative dose is understandably greater the longer the time interval between individual injections.)

It follows from these considerations that, as has proved to be the case in the treatment of syphilis with arsenicals, there is no optimum method for the treatment of human trypanosomiasis with p-arsenosphenylbutyric acid. Provided only that an adequate total amount of the drug is administered, the schedule of injections may, within limits, be adjusted to the convenience of the physician and the patient. Thus, if the treatment "team" is to remain in a given village center until all the population in that area has been surveyed, and until all the cases discovered have completed their treatment, then the duration of treatment is an important consideration. The experience to date indicates that more than 90 percent of early patients may be cured within a period of 2 weeks by daily injections of p-arsenosphenylbutyric acid at 0.5 mg. per kg. to a total of 6 to 7 mg. per kg. There is, moreover, reason to believe that treatment can be completed within 1 week, with almost equal safety, by daily injections at 1 mg. per kg. to the same total dose of 6 to 7 mg. per kg. The compound is however, equally adapted to those plans of treatment in which a mobile "team" travels between three to six treatment centers, remaining in each only long enough to give one injection, and repeating the circuit of those villages for as many times as may be necessary to effect cures. In such case the compound may be injected at 0.5 or 1 mg. per kg. either once weekly, twice weekly, weekly, or even irregularly, to the usual total of approximately 6 to 7 mg. per kg.

There seems to be little to choose between intravenous and intramuscular injection. Both appear to be effective; and against the relative simplicity of the latter procedure is to be weighed the transitory discomfort at the site of injection.

#### Summary

1. Three hundred and nineteen human cases of early *T. gambiense* infection have been treated with p-arsenosphenylbutyric acid in varying doses, and thereafter observed for varying periods, up to a present maximum of 18 months. These cases, treated with the collaboration of the Sleeping Sickness Services of the Belgian Congo, French Equatorial Africa, French West Africa, the Gold Coast,

Nigeria, and the Firestone Plantation in Liberia represent a reasonable cross section of the disease with respect to age, sex, and geographic distribution. In 221 of these the spinal fluid was known to be normal, and in the remaining 98 it was assumed to be normal on the basis of history and clinical findings.

2. Of the cases known to have been treated in the early stage of the disease, the results varied with the total of drug administered. Thus, at total dosages of 3.5, 3.5 to 4.9, 5.0 to 6.4 and 6.5 or more milligrams per kilogram, the incidence of observed failure to date has been 26, 10, 8, and 4.5, respectively. Although these are crude rates, not corrected for the varying periods of observation, they are believed to represent correct orders of magnitude; and it is estimated that more than 90 percent of the cases can be cured by a total dosage of 6 to 7 mg. per kg.

3. Within the limits of the present experience, the therapeutic efficacy of the compound has been independent of variations in the amount per injection, the number of injections, their frequency, or the total duration of treatment. The important consideration has been solely the total amount of drug received.

4. In 12 patients, intramuscular injections proved as effective as intravenous, and produced only transitory local reaction.

5. Although most of the patients in the present series received an average dose of 0.4 mg. per kg. per injection, as much as 2 mg. per kg. has been injected intravenously daily for 10 days with no untoward effects. The immediate reaction so often observed after the injections of trivalent arsenicals has been conspicuously uncommon, occurring after less than 1 percent of 4,000 injections. Two of the patients died soon after a course of treatment. In one, the physician having left the village, there is no information as to the cause of death. The other is said to have been "possibly a toxic reaction to arsenical."

6. Early infections with *T. gambiense* may be definitively cured within 2 weeks by 12 to 14 daily injections at 0.5 mg. per kg., or within 1 week by 6 to 7 injections at 1 mg. per kg. Where daily injections are not feasible, the same number of injections may be given at any desired interval, up to 1 week apparently, with equal therapeutic efficacy.

7. With the cooperation of the several Sleeping Sickness Services, studies are now in progress on the treatment of advanced cases with central nervous involvement, using *p*-arsenosphenylbutyric acid alone and in combination with other trypanocidal agents. Studies on animal infestations are also in progress.



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## PUBLIC HEALTH SERVICE PUBLICATIONS

## A List of Publications Issued During the Period January-December 1945

There is given herewith a list of publications of the United States Public Health Service issued during the period January-December 1945.

The purpose of this list is to provide a complete and continuing record of Public Health Service publications, for reference use by librarians, scientific workers, and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free distribution.

Single sample copies are available from the Public Inquiries Section, Office of Health Information, United States Public Health Service, Washington 25, D. C.

Quantities may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at prices shown, with a reduction of 25 percent on lots of 100 copies or more of a single publication.

Those publications marked with an asterisk (\*) can be obtained only by purchase.

#### Periodicals

\*Public Health Reports (weekly), January–December, vol. 60, Nos. 1 to 52, pages 1 to 1581. 10 cents a number.

\*Venereal Disease Information (monthly), January–December, vol. 26, Nos. 1 to 12, pages 1 to 280. 10 cents a number. Title changed to The Journal of Venereal Disease Information, July 1945.

\*Journal of the National Cancer Institute (bimonthly), February–June 1945, vol. 5, Nos. 4 to 6, pages 233 to 454; August–December 1945, vol. 6, Nos. 1 to 3, pages 1 to 195. 40 cents a number.

Public Health Engineering Abstracts (monthly), January–November, vol. XXV, Nos. 1 to 11, 32 pages each; index to vol. XXV. (This index takes the place of issue No. 12 of the Abstracts.) No sales stock.

National Negro Health News (quarterly), January–December, vol. 13, Nos. 1 to 4, 24 pages each. No sales stock.

#### Reprints From the Public Health Reports

1697. The control of communicable diseases. Report of a committee of the American Public Health Association. (Revised 1945.) 88 pages. 15 cents.

2595. Justice and the future of medicine. By Wendell Berge. January 5, 1945. 16 pages. No sales stock.

2596. Tularemia: Spontaneous occurrence in the chipmunk. By R. R. Parker. January 5, 1945. 1 page. 5 cents.

2597. A study of the complement fixation and Weil-Felix reactions in wild rats as related to the isolation of the virus of endemic typhus. By George D. Brigham and Ida A. Bengtson. January 12, 1945. 18 pages. 10 cents.

2598. Studies of the acute diarrheal diseases. XII. Etiology. By Albert V. Hardy and James Watt. January 19, 1945. 10 pages. 5 cents.

2599. The metabolism of 2, 2 bis(p-chlorophenyl) 1, 1, 1 trichloroethane (DDT). I. A metabolite from rabbit urine, di(p-chlorophenyl) acetic acid; its isolation, identification, and synthesis. By William C. White and Thomas R. Sweeney. January 19, 1945. 6 pages; 2 plates. 5 cents.

2600. Free plasma for North Dakotans. By Melvin E. Koons. January 26, 1945. 5 pages. 5 cents.

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2606. Cultivation of mumps virus in the developing chick embryo and its application to studies of immunity to mumps in man. By Karl Habel. February 23, 1945. 12 pages. 5 cents.
2607. Studies of the acute diarrheal diseases. XIII. Cultural surveys of normal population groups. By James Watt and Albert V. Hardy. March 9, 1945. 13 pages. 5 cents.
2608. Directory of full-time local health officers. (Revised to January 1, 1945.) September 15, 1944. 34 pages. 10 cents.
2609. Further studies on the pharmacologic action of 2,2 bis (p-chlorophenyl) 1,1,1 trichlorethane (DDT). By M. I. Smith and E. F. Stohlman. March 16, 1945. 13 pages; 4 plates. 10 cents.
2610. A comparison of the effect of penicillin and immune serum in the treatment of experimental leptospirosis in young white mice and in hamsters. By C. L. Larson and J. J. Griffiths. March 23, 1945. 8 pages. 5 cents.
2611. The titration of *Clostridium perfringens* (Welchii) antitoxin by its anti-hemolytic activity. By Sarah E. Stewart. March 30, 1945. 6 pages. 5 cents.
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2613. An outward opening combination storm and screen door. By R. E. Dorer. February 2, 1945. 2 pages; 2 plates. 5 cents.
2614. Preliminary report on the identification of 2,2 bis(p-chlorophenyl)-1,1,1 trichlorethane (DDT) in the excreta of poisoned rabbits. By E. F. Stohlman. March 30, 1945. 4 pages; 1 plate. 5 cents.
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2616. Experimental chemotherapy of burns and shock. VIII. I. Effects of potassium administration, of sodium loss, and fluid loss in tourniquet shock. II. Electrolyte changes in tourniquet shock. By Herbert Tabor and Sanford M. Rosenthal. April 6 and 13, 1945. 28 pages. 10 cents.
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2635. Observations on the use of DDT for the control of *Anopheles quadrimaculatus*. By R. L. Metcalf, A. D. Hess, G. E. Smith, G. M. Jeffery, and G. L. Ludwig. July 6, 1945. 22 pages; 4 plates. 10 cents.
2636. Executive order declaring Public Health Service commissioned corps a military service. July 5, 1945. 4 pages. 5 cents.
2637. Studies in connection with the selection of a satisfactory culture medium for bacterial air sampling. By Roy Schneiter, John E. Dunn, and Barbara H. Caminita. July 13, 1945. 18 pages; 1 plate. 10 cents.
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2650. DDT water emulsion in rice fields as a method of controlling larvae of *Anopheles quadrimaculatus* and other mosquitoes. By Frederick L. Knowles and Frank W. Fisk. August 31, 1945. 16 pages; 1 plate. 10 cents.
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2668. DDT residual house spray—a method of malaria control in rural areas. By Frederick L. Knowles and Clinton S. Smith. October 26, 1945. 6 pages. 5 cents.
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2682. Apparent serological heterogeneity among strains of tsutsugamushi (scrub typhus). By Ida A. Bengtson. December 14, 1945. 6 pages. 5 cents.
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2684. Legislation on hospital surveys, construction, and licensing considered by State legislatures in 1945. By Mary M. Guerin. December 21, 1945. 21 pages. 10 cents.
2685. Notes on compulsory sickness insurance legislation in the States, 1939-44. By Adela Stucke. December 28, 1945. 14 pages. 5 cents.

#### Supplements to the Public Health Reports

179. The biological, hygienic, and medical properties of zinc and zinc compounds. By D. Mark Hegsted, John M. McKibbin, and Cecil K. Drinker. 1945. 44 pages. 10 cents.
180. Directory of State and Territorial health authorities, 1944. 1945. 16 pages. 5 cents.
181. Formaldehyde—its toxicity and potential dangers. 1945. 9 pages. 5 cents.
182. The notifiable diseases. Prevalence of certain important communicable diseases, by States, 1943. 1945. 12 pages. 5 cents.
183. Toxicity and potential dangers of aerosols and residues from such aerosols containing three percent DDT. (Second report.) By P. A. Neal, W. F. von Oettingen, R. C. Dunn, and N. E. Sharpless. 1945. 32 pages. No sales stock.
184. A comparative study of sampling devices for air-borne micro-organisms. By H. G. duBuy, Alexander Hollaender, and Mary D. Lackey. 1945. 40 pages. 10 cents.
185. Rural water-supply sanitation. Recommendations of the Joint Committee on Rural Sanitation. 1945. 56 pages. 10 cents.
186. The use of DDT in mosquito control. 1945. 96 pages; 8 plates. 20 cents. Also issued in Separates, as follows:

Separate No. 1. DDT investigations at the Henry R. Carter Memorial Laboratory. By S. W. Simmons. 1945. 4 pages. 5 cents.

Separate No. 2. Techniques and apparatus used in experimental studies on DDT as an insecticide for mosquitoes. By S. W. Simmons and Staff. 1945. 20 pages; 6 plates. 10 cents.

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- Separate No. 8. The experimental use of DDT in the control of the yellow fever mosquito *Aedes aegypti* (L). By W. M. Upholt, T. B. Gaines, S. W. Simmons, and E. H. Arnold. 1945. 8 pages. 5 cents.
187. Devices for reducing health department records and reports. By Joseph W. Mountin and Evelyn Flook. 1945. 67 pages. No sales stock.
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189. A study of nursing school health practices and a recommended health program for student nurses. By Burnet M. Davis, Robert H. Felix, Charlotte Silverman, and Marion E. Altenderfer. 1945. 22 pages. 10 cents.

#### Public Health Bulletins

289. Bibliography of industrial hygiene 1900-1943. A selected list. Compiled by Ellen F. Bellingham, J. J. Bloomfield, and Waldemar C. Dreessen. 1945. 95 pages. 20 cents.
290. Carbon monoxide: Its hazards and the mechanism of its action. By W. F. von Oettingen. 1944. 257 pages. 35 cents.
291. A medical study of the effect of TNT on workers in a bomb and shell loading plant. By Rudolph F. Sievers, Alfred H. Lawton, Folke Skoog, Paul A. Neal, and W. F. von Oettingen. Report of fatal case of aplastic anemia. By Robert L. Stump, A. Ralph Monaco, and Rudolph F. Sievers. 1945. 98 pages; 8 half-tones. 25 cents.
292. Health service areas. Requirements for general hospitals and health centers. By Joseph W. Mountin, Elliott H. Pennell, and Vane M. Hoge. 1945. 68 pages. 25 cents.
293. The toxicity of molybdenum. By Lawrence T. Fairhall, Robert C. Dunn, Norman E. Sharpless, and E. A. Pritchard. 1945. 36 pages. 10 cents.

#### National Institute of Health Bulletin

183. Studies of typhus fever. By N. H. Topping, I. A. Bengtson, R. G. Henderson, C. C. Shepard, and M. J. Shear. 1945. 110 pages. 20 cents.

#### Miscellaneous Publications

32. Manual for coding causes of illness according to a diagnosis code for tabulating morbidity statistics. 1944. 489 pages. \$1.25.



33. At your service. (A pictorial story of the need for an industrial hygiene program—how the experts help solve troublesome problems of unhealthy environment—and how a plant medical and nursing service can help keep workers well.) 1945. 20 pages. 10 cents.
34. Brucellosis (undulant fever). By Alice C. Evans. 1945. 3 pages. 5 cents.

#### Cancer Series

2. Breast cancer. 1945. 9 pages. 5 cents.

#### Annual Report

Annual Report of the Surgeon General of the United States Public Health Service for the fiscal year 1944. 1944. 120 pages. 20 cents.

#### Unnumbered Publications

- Index to Public Health Reports, vol. 59, part 2, July–December 1944. 1945. 10 pages. 5 cents.
- Index to Public Health Reports, vol. 60, part 1, January–June 1945. 1945. 14 pages. 5 cents.
- Index to Journal of the National Cancer Institute, vol. V, August 1944–June 1945. 1945. 9 pages. 5 cents.
- Foreword to Annual Report of the United States Public Health Service, 1944. By Thomas Parran. 1945. 11 pages. No sales stock.
- National Negro Health Week program. This pamphlet is published annually, usually during March, for community leaders in an effort to suggest ways and means by which interested individuals and organizations may be organized for a concerted and effective attack upon the community's disease problems. Thirty-first observance, April 1–8, 1945. 16 pages. 5 cents; \$2.25 per 100 copies.
- National Negro Health Week leaflet. Thirty-first observance. 1945. 2 pages. 5 cents; \$0.50 per 100 copies.
- National Negro Health Week poster. Thirty-first observance. 1945. 5 cents; \$1 per 100 copies.

#### Reprints from Venereal Disease Information

234. New cases of syphilis and gonorrhea in States, Territories, possessions, Panama Canal Zone, and cities of 200,000 population and over: Statistical reports for the fiscal years 1943–44 and 1942–43. October 1944. 3 pages. 5 cents.
235. New Jersey's penicillin treatment plan for syphilis and gonorrhea. By J. Lynn Mahaffey and Glenn S. Usher. January 1945. 4 pages. 5 cents.
236. The medical officer and the venereal disease education of the soldier. By Robert Dyar. February 1945. 7 pages. 5 cents.
237. Penicillin serum concentrations in the treatment of gonorrhea by delayed intramuscular absorption. By B. L. Zinnamon and V. P. Seeberg. February 1945. 4 pages. 5 cents.
238. The treatment of neurosyphilis by continuous infusion of typhoid vaccine. By Albert Heyman. March 1945. 8 pages. 5 cents.
239. Serologic survey and venereal disease educational program at the San Francisco County Jail. By Richard A. Koch and Lee Hand. April 1945. 8 pages. 5 cents.

240. A State-wide gonococcus culture service. A system utilizing the mail for transmission of specimens. By Glenn S. Usher and Russell Stein. April 1945. 4 pages. 5 cents.
241. Penicillin in gonorrhea—editorial. Penicillin in the treatment of gonorrhea. Results with six hundred and seventy-five women. By Ruth Boring Thomas and Edda Meyer. Treatment of gonorrhea by a single intramuscular injection of penicillin-oil-beeswax: A cooperative study of 1,060 cases. By C. J. Van Slyke and J. R. Heller, Jr. Accelerated methods of treating gonorrhea in the female with penicillin-wax-oil mixtures. By William E. Graham, Robert B. Greenblatt, and George R. Cannefax. May 1945. 20 pages. 10 cents.
242. Analysis of case-finding methods in community venereal disease control. By Harry Pariser. June 1945. 11 pages. 5 cents.
243. Syphilis control through mass blood testing. By W. H. Y. Smith, Lida J. Usilton, and Martha C. Bruyere. June 1945. 4 pages. 5 cents.
244. Contact investigation as a case-finding instrument. By Albert P. Iskrant. June 1945. 8 pages. 5 cents.
245. Clinical action of penicillin on the uterus. By Herbert M. Leavitt. July 1945. 4 pages. 5 cents.
246. State and Territorial health officers consider the problem of venereal disease control. By J. R. Heller. August 1945. 8 pages. 5 cents.
247. The economic cost of paresis in the United States. By Albert P. Iskrant. August 1945. 10 pages. 5 cents.
248. The significance of the first lapse in outpatient venereal disease clinics. By Frederick G. Gillick, Dorothy Stubbs, and Robert R. Swank. September 1945. 4 pages. 5 cents.
249. The frequency of positive serologic test for syphilis in relation to occupation and marital status among men of draft age. By Lida J. Usilton, Paul T. Bruyere, and Martha C. Bruyere. October 1945. 8 pages. 5 cents.
250. The possibility of predicting the future needs in venereal disease control. A study of the effects of mobilization on the case load in District of Columbia clinics. By George C. Ruhland, Frederick G. Gillick, and Ben D. Chinn. October 1945. 8 pages. 5 cents.
251. U. S. Public Health Service Advisory Committee on Public Education for the Prevention of Venereal Diseases—Report to the Surgeon General. By H. H. Hazen. December 1945. 8 pages. 5 cents.
252. Syphilis among civilians during World War II, January 1, 1942, through June 30, 1943. By Lida J. Usilton. December 1945. 4 pages. 5 cents.

#### Venereal Disease Bulletins

97. The diagnosis of gonorrhea in women. Collection of material for laboratory examination. By P. S. Pelouze. 1945. 7 pages, illustrated. 5 cents.
98. Requirements of premarital legislation. By Margaret R. Zwally and John F. Mahoney. 1945. 20 pages. 10 cents.

## PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

May 19-June 15, 1946

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended June 15, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941-45.

### DISEASES ABOVE MEDIAN PREVALENCE

*Poliomyelitis.*—The number of cases of poliomyelitis rose from 210 during the preceding 4-week period to 567 during the 4 weeks ended June 15. Of the total number of cases reported, 123 occurred in Texas, 111 in Florida, 66 in Alabama, 49 in California, 23 in Colorado, 20 in Louisiana, 17 in Illinois, and 16 in Oklahoma—75 percent of the cases were reported from those 8 States. Cities reporting the largest numbers of cases since the beginning of the year are: Miami 48 cases, Tampa 26, New Orleans 44, San Antonio 49, and Denver 20 cases. Compared with preceding years the current incidence was 1.9 times the 1945 figure for the same 4 weeks, and 2.4 times the 1941-45 median for this period which was represented by the 1944 incidence (237 cases). Each section except the New England and Middle Atlantic contributed to the increase over 1945, and in all sections except the New England the numbers of cases were considerably above the preceding 5-year medians. In the West South Central section the number of cases (165) was almost 4 times the median; in the East South Central section the number (86) was 8 times the median; in the South Atlantic and Mountain regions the numbers (139 and 30, respectively) were 5 times the median; and in the West North Central section the number of cases (32) was more than 6 times the median. Minor increases only were reported from the other sections. An increase of this disease is normally expected at this season of the year, but the rate of increase during the current period was considerably above the rate during these same weeks in the three preceding years, each of which contained a major epidemic.

*Diphtheria.*—The incidence of diphtheria continued at a high level. For the 4 weeks ended June 15 there were 1,047 cases reported, as compared with 810 for the corresponding period in 1945 and a 1941-45 median of 703 cases. Each section of the country reported an increase over last year's figures for these weeks and in each section except the

East North Central the number of cases represented an appreciable increase over the 1941-45 median. The largest relative increases occurred in the New England and West North Central sections, with minor increases in all of the other sections. For the country as a whole the current incidence was the highest in this period since 1938 when 1,260 cases were reported.

*Measles.*—The number of cases (100,093) of measles reported for the current 4 weeks was the highest recorded for this period since 1941 when 111,273 cases were reported. The incidence was more than 5 times that in 1945, and 1.6 times the 1941-45 median. Each section of the country contributed to the increase over the 1945 figures and in each region except the West North Central the number of cases was considerably above the 1941-45 median. In the Middle Atlantic

*Number of reported cases of 9 communicable diseases in the United States during the 4-week period May 19-June 15, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941-45*

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	1,047	810	703	2,562	3,479	3,479	100,093	19,349	62,904
New England.....	37	21	14	3	81	14	14,413	1,786	6,472
Middle Atlantic.....	167	103	94	26	21	23	33,469	3,155	9,869
East North Central.....	136	125	131	106	148	180	18,139	3,309	11,186
West North Central.....	117	83	46	30	48	43	3,519	873	4,496
South Atlantic.....	181	134	108	871	745	895	9,832	607	4,621
East South Central.....	70	45	42	117	112	153	1,652	354	919
West South Central.....	160	154	109	1,185	1,905	1,532	5,852	1,990	2,380
Mountain.....	69	50	50	175	346	346	4,324	982	2,789
Pacific.....	110	95	84	49	73	213	8,893	6,293	6,293
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States.....	419	639	639	566	302	237	9,485	15,512	10,123
New England.....	18	36	36	1	5	5	839	1,720	1,415
Middle Atlantic.....	91	145	145	25	41	14	3,175	4,525	3,213
East North Central.....	73	142	142	33	16	12	2,639	4,234	3,041
West North Central.....	33	64	64	32	1	5	653	1,101	700
South Atlantic.....	50	88	88	139	50	27	690	1,294	662
East South Central.....	47	49	49	85	21	11	197	292	278
West South Central.....	56	56	56	165	128	43	183	363	175
Mountain.....	6	11	11	30	8	6	297	419	419
Pacific.....	45	48	48	55	32	29	757	1,574	731
	Smallpox			Typhoid and paratyphoid fever			Whooping cough <sup>3</sup>		
United States.....	37	25	43	321	323	411	7,968	10,203	15,016
New England.....	0	0	0	23	17	23	875	1,154	1,154
Middle Atlantic.....	0	0	0	26	35	56	1,535	1,969	2,484
East North Central.....	12	3	17	22	22	35	1,687	1,100	3,115
West North Central.....	7	14	9	16	8	23	284	255	483
South Atlantic.....	1	2	2	53	61	106	1,365	1,792	1,792
East South Central.....	0	0	7	42	67	47	372	453	622
West South Central.....	1	2	10	82	70	86	863	1,252	1,252
Mountain.....	9	3	4	26	19	15	439	359	576
Pacific.....	7	1	3	26	24	24	548	1,879	1,826

<sup>1</sup> Mississippi and New York excluded; New York City included.

<sup>2</sup> Mississippi excluded.

section the number of cases was 3.5 times the median and in the New England, South Atlantic, and West South Central sections the numbers were more than twice the respective medians. Minor increases were reported from the other sections.

#### DISEASES BELOW MEDIAN PREVALENCE

*Influenza*.—For the 4 weeks ended June 15 there were 2,562 cases of influenza reported. The number was about 70 percent of the number reported for this period in 1944 and also of the 1941–45 median which was represented by the 1945 figure (3,479 cases). The incidence was about normal in the Middle Atlantic, West North Central, and South Atlantic sections, but was relatively low in the other 6 geographic regions.

*Meningococcus meningitis*.—The number of cases (419) of this disease reported during the current 4 weeks was less than 70 percent of the 1941–45 median (639 cases) for the corresponding 4-week period. In the South Central, Mountain, and Pacific sections the incidence stood at about the 1941–45 median level, but in the North Central and Atlantic Coast sections the incidence was considerably below the seasonal expectancy.

*Scarlet fever*.—The incidence of scarlet fever continued at a relatively low level, the number of cases (9,485) reported for the current 4-week period being about 70 percent of the number reported for the corresponding weeks in 1945 and 90 percent of the 1941–45 median. The incidence was slightly above the seasonal expectancy in the South Atlantic, West South Central, and Pacific sections, but in other regions the numbers of cases were below the preceding 5-year medians.

*Smallpox*.—The number of cases (37) of smallpox was higher than the number reported for these same weeks in 1945 but it was lower than the 1941–45 median (43 cases). In both the Mountain and Pacific sections the numbers of cases were about two and one-half times the respective medians, but in all other sections the numbers were below the expected seasonal incidence.

*Typhoid and paratyphoid fever*.—For the 4 weeks ended June 15 there were 321 cases of these diseases reported, as compared with 323 for the corresponding period in 1945 and a 1941–45 median of 411 cases. The numbers of cases were considerably below the 1941–45 median in the Middle Atlantic, East North Central, and South Atlantic sections, but in all other regions the incidence closely approximated the preceding 5-year medians.

*Whooping cough*.—The incidence of whooping cough was also relatively low, the number of cases (7,968) being less than 80 percent of the number reported for the corresponding 4 weeks in 1945 and about 55 percent of the 1941–45 median. The situation was favorable in

all sections of the country; each section except the East North Central and Mountain reported fewer cases than occurred during these weeks in 1945, and all sections reported a decline from the 1941-45 median figures.

#### MORTALITY, ALL CAUSES

For the 4 weeks ended June 15 there were 35,103 deaths from all causes reported to the Bureau of the Census by 93 large cities. The preceding 3-year average for the corresponding weeks was 35,015 deaths. The numbers of deaths were lower than the preceding 3-year average during the first 2 weeks of the 4-week period, but during the third and fourth weeks the numbers were 4.2 and 2.8 percent, respectively, higher than the 1943-45 averages.

#### INCIDENCE OF HOSPITALIZATION, MAY 1946

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country, mostly in large cities:

Item	May	
	1946	1945
1. Number of plans supplying data.....	80	81
2. Number of persons eligible for hospital care.....	19,999,085	17,737,698
3. Number of persons admitted for hospital care.....	197,365	165,879
4. Incidence per 1,000 persons, annual rate during current month (daily rate × 365).....	116.2	100.7
5. Incidence per 1,000 persons, annual rate for the 12 months ended May 31, 1946.....	108.8	104.2
6. Number of plans reporting on hospital days.....	28	25
7. Days of hospital care per case discharged during month <sup>1</sup> .....	8.47	8.07

<sup>1</sup> Days include entire stay of patient in hospital whether at full pay or at a discount.

#### DEATHS DURING WEEK ENDED JUNE 15, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 15, 1946	Correspond- ing week, 1945
Data for 93 large cities of the United States:		
Total deaths.....	8,782	8,849
Average for 3 prior years.....	8,544	
Total deaths, first 24 weeks of year.....	231,370	225,453
Deaths under 1 year of age.....	600	570
Average for 3 prior years.....	600	
Deaths under 1 year of age, first 24 weeks of year.....	14,811	14,744
Data from industrial insurance companies:		
Policies in force.....	67,204,646	67,368,637
Number of death claims.....	11,718	14,204
Death claims per 1,000 policies in force, annual rate.....	9.1	11.0
Death claims per 1,000 policies, first 24 weeks of year, annual rate.....	10.4	10.9

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED JUNE 22, 1946

#### Summary

The incidence of poliomyelitis increased slightly during the week in all of the 9 geographic divisions except the East South Central. A total of 204 cases was reported, as compared with 184 last week and a 5-year (1941-45) median of 116. States reporting currently more than 4 cases are as follows (last week's figures in parentheses): *Increases*—New York 7 (4), Illinois 12 (6), Kansas 7 (4), Florida 34 (25), Louisiana 8 (3), Texas 44 (39), Colorado 11 (10), California 18 (14); *decreases*—Alabama 16 (25), Oklahoma 5 (10). Since March 16 a total of 1,117 cases has been reported, as compared with 718 for the same period last year, 519 in 1944, and 592 in 1943. The total for the year to date is 1,583, as compared with 1,115 for the same period last year and an average of 675 for the corresponding periods of the years 1935-44.

Six cases of smallpox were reported for the week—2 in Missouri, and 1 each in Ohio, Tennessee, Louisiana, and Idaho. To date 248 cases have been reported for the country as a whole (including 68 in Washington and 14 in California), as compared with 240 for the corresponding period last year and a 5-year median of 554.

Of the total of 222 cases of diphtheria reported for the week (last week 256), 26 occurred in Texas, 24 in Pennsylvania, 22 in New York, 19 in California, 11 in Ohio, and 10 each in Maryland and Arizona. The total to date is 8,203 as compared with 6,533 for the corresponding period last year and a 5-year median of 6,178.

Approximately 50 cases of Q fever were reported to have occurred in Amarillo, Tex., during the second and third weeks of March. For the week ended June 15, 6 cases of dengue fever and 4 cases of relapsing fever were reported in Texas.

Deaths recorded during the week in 93 large cities of the United States totaled 8,628, as compared with 8,752 for the preceding week, 9,111 and 8,557, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,925. The total for the year to date for these cities is 239,968, as compared with 234,564 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended June 22, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	June 22, 1946	June 23, 1945		June 22, 1946	June 23, 1945		June 22, 1946	June 23, 1945		June 22, 1946	June 23, 1945	
NEW ENGLAND												
Maine.....	2	2	0	—	—	—	201	1	69	0	0	0
New Hampshire.....	0	0	0	—	—	—	101	—	5	0	1	0
Vermont.....	0	0	0	—	—	—	225	59	59	0	0	0
Massachusetts.....	8	1	2	—	—	—	1,662	330	676	0	3	9
Rhode Island.....	0	0	0	1	—	—	91	18	18	0	1	1
Connecticut.....	1	2	1	1	1	1	484	59	200	1	2	2
MIDDLE ATLANTIC												
New York.....	22	11	13	2	4	2	2,234	170	906	9	14	17
New Jersey.....	9	2	3	—	4	3	1,404	64	432	2	3	3
Pennsylvania.....	24	9	9	—	—	—	1,109	769	553	9	10	10
EAST NORTH CENTRAL												
Ohio.....	11	1	2	3	2	2	548	45	182	3	3	4
Indiana.....	0	8	3	—	4	2	143	22	63	2	1	1
Illinois.....	6	1	7	1	4	6	315	335	335	2	17	17
Michigan <sup>1</sup> .....	4	17	9	—	—	1	334	261	345	1	6	6
Wisconsin.....	4	3	1	11	4	9	1,109	100	892	1	2	2
WEST NORTH CENTRAL												
Minnesota.....	5	2	2	—	—	—	67	6	117	2	0	1
Iowa.....	3	2	1	—	—	—	174	39	85	2	1	0
Missouri.....	2	4	2	2	8	—	71	14	65	1	5	5
North Dakota.....	0	1	1	4	10	4	11	3	13	0	0	0
South Dakota.....	2	0	0	—	—	—	10	5	5	0	0	0
Nebraska.....	4	0	1	—	—	—	68	48	48	1	0	0
Kansas.....	3	3	1	1	1	1	30	40	68	1	2	2
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	17	3	3	0	0	0
Maryland <sup>2</sup> .....	10	8	4	4	2	2	540	11	74	2	3	3
District of Columbia.....	0	0	0	—	—	—	91	4	46	2	0	2
Virginia.....	3	6	3	70	35	35	200	22	112	3	1	8
West Virginia.....	2	1	1	2	—	2	18	1	25	0	2	1
North Carolina.....	6	2	4	—	—	—	138	14	120	0	0	1
South Carolina.....	2	8	1	114	66	80	142	10	40	1	0	1
Georgia.....	5	4	4	3	1	12	60	6	29	0	0	2
Florida.....	3	0	2	2	1	6	32	3	50	1	0	1
EAST SOUTH CENTRAL												
Kentucky.....	1	1	2	—	1	1	84	17	17	6	3	3
Tennessee.....	4	2	3	16	8	8	96	28	28	6	2	5
Alabama.....	3	6	2	10	14	14	121	1	48	1	5	5
Mississippi <sup>3</sup> .....	2	8	2	—	—	—	—	—	—	0	1	1
WEST SOUTH CENTRAL												
Arkansas.....	1	4	3	0	1	7	36	33	33	1	3	1
Louisiana.....	3	3	3	1	1	1	55	10	13	4	0	1
Oklahoma.....	0	1	1	4	15	10	32	20	67	1	1	1
Texas.....	26	22	23	366	390	189	545	260	260	0	10	5
MOUNTAIN												
Montana.....	1	0	0	1	3	1	93	5	18	0	0	0
Idaho.....	0	1	0	12	—	—	21	3	8	0	1	1
Wyoming.....	1	0	0	—	—	—	10	12	18	0	0	0
Colorado.....	4	1	5	6	18	18	133	13	64	1	0	0
New Mexico.....	3	2	2	2	—	1	45	6	11	0	1	1
Arizona.....	10	1	1	14	38	38	94	3	34	0	0	0
Utah <sup>3</sup> .....	0	0	0	2	2	1	101	183	98	1	2	1
Nevada.....	0	0	0	—	2	—	1	—	1	0	0	0
PACIFIC												
Washington.....	1	8	5	—	4	1	65	180	180	1	3	3
Oregon.....	2	0	1	1	1	1	196	26	44	0	0	3
California.....	19	26	19	7	10	28	1,251	944	944	11	13	13
Total.....	222	184	168	878	655	609	14,611	4,206	8,695	85	126	175
25 weeks.....	8,203	6,533	6,178	187,748	65,562	77,766	801,359	87,745	496,644	8,939	5,276	5,175

<sup>1</sup> Includes delayed reports.

<sup>2</sup> New York City only.

<sup>3</sup> Period ended earlier than June 22, 1946.



Telegraphic morbidity reports from State health officers for the week ended June 22, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>4</sup>		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	June 22, 1946	June 23, 1945		June 22, 1946	June 23, 1945		June 22, 1946	June 23, 1945		June 22, 1946	June 23, 1945	
NEW ENGLAND												
Maine.....	0	0	0	7	27	14	0	0	0	0	0	0
New Hampshire.....	0	0	0	7	10	2	0	0	0	0	0	0
Vermont.....	0	0	0	1	4	4	0	0	0	0	0	0
Massachusetts.....	0	0	0	100	179	164	0	0	0	9	0	3
Rhode Island.....	0	0	0	4	5	5	0	0	0	0	0	0
Connecticut.....	2	3	1	17	16	25	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York.....	7	16	6	263	427	219	0	0	0	5	6	7
New Jersey.....	4	2	1	99	77	71	0	0	0	3	3	2
Pennsylvania.....	1	1	1	127	204	141	0	0	0	3	2	4
EAST NORTH CENTRAL												
Ohio.....	2	10	3	145	197	101	1	0	0	0	1	4
Indiana.....	2	0	0	31	31	20	0	1	0	0	1	1
Illinois.....	12	2	3	97	129	87	0	0	0	2	2	4
Michigan <sup>1</sup> .....	0	1	1	75	167	158	0	0	0	2	5	4
Wisconsin.....	1	0	0	49	86	86	0	0	1	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	1	0	1	34	64	23	0	0	0	1	0	0
Iowa.....	1	1	0	11	20	15	0	2	1	0	0	0
Missouri.....	1	1	1	13	23	22	2	0	0	2	2	1
North Dakota.....	2	0	0	5	3	5	0	0	0	0	4	0
South Dakota.....	0	0	0	6	1	3	0	0	0	0	0	0
Nebraska.....	1	0	0	9	19	9	0	0	0	1	0	0
Kansas.....	7	2	1	15	43	18	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware.....	0	0	0	1	1	2	0	0	0	0	0	0
Maryland <sup>1</sup> .....	0	1	0	21	47	29	0	0	0	1	0	2
District of Columbia.....	0	0	0	7	18	8	0	0	0	0	1	0
Virginia.....	0	0	0	23	27	10	0	0	0	1	4	4
West Virginia.....	1	0	0	6	22	17	0	0	0	4	2	3
North Carolina.....	4	0	1	8	27	11	0	0	0	5	0	3
South Carolina.....	1	5	2	1	2	2	0	0	0	3	2	2
Georgia.....	4	5	1	4	11	7	0	0	0	4	11	11
Florida.....	34	2	1	2	2	2	0	0	0	3	0	2
EAST SOUTH CENTRAL												
Kentucky.....	2	0	1	16	22	17	0	0	3	3	5	3
Tennessee.....	0	2	1	15	9	9	1	0	0	6	3	3
Alabama.....	16	8	3	8	6	3	0	0	0	1	5	2
Mississippi <sup>1</sup> .....	4	1	2	1	12	3	0	0	0	2	3	4
WEST SOUTH CENTRAL												
Arkansas.....	1	0	2	2	7	2	0	0	0	3	7	6
Louisiana.....	8	0	2	6	12	4	1	0	0	6	4	6
Oklahoma.....	5	3	2	3	9	3	0	1	0	1	2	3
Texas.....	44	39	4	14	39	25	0	1	0	15	15	16
MOUNTAIN												
Montana.....	0	0	0	2	6	9	0	0	0	2	1	1
Idaho.....	0	0	0	1	4	4	1	0	0	1	1	1
Wyoming.....	0	0	0	4	6	4	0	0	0	0	0	0
Colorado.....	11	2	1	31	21	21	0	0	0	0	0	2
New Mexico.....	3	0	0	4	7	5	0	0	0	0	2	1
Arizona.....	0	0	1	4	12	12	0	0	0	0	0	1
Utah <sup>1</sup> .....	1	0	0	13	10	10	0	0	0	0	1	0
Nevada.....	0	0	0	1	3	0	0	0	0	0	0	0
PACIFIC												
Washington.....	2	0	0	16	39	23	0	0	0	0	2	2
Oregon.....	1	0	0	16	11	10	0	0	0	0	1	1
California.....	18	9	7	137	234	129	0	0	0	9	1	6
Total.....	204	116	116	1,482	2,448	1,836	6	5	8	98	99	124
26 weeks.....	1,583	1,115	782	80,891	126,110	91,042	248	240	554	1,448	1,606	2,004

<sup>1</sup> Includes delayed reports.

<sup>2</sup> Period ended earlier than Saturday.

<sup>4</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 8; New York 1; New Jersey 1; Illinois 1; Maryland 1; Georgia 1; Florida 3; Louisiana 2; Texas 2; California 7.

Telegraphic morbidity reports from State health officers for the week ended June 22, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended June 22, 1946								
	Week ended—		Median 1941-45	Dysentery			Enceph- alitis, infectious	Rocky Mt. spotted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever	
	June 22, 1946	June 23, 1945		Ame- bio	Bacil- lary	Un- spec- ified						
NEW ENGLAND												
Maine.....	9	46	22	1								
New Hampshire.....	3		2				3				1	
Vermont.....	11	16	18								3	
Massachusetts.....	139	75	96								2	
Rhode Island.....	21	19	19									
Connecticut.....	26	39	39		1		1				5	
MIDDLE ATLANTIC												
New York.....	136	177	245	19	18		1				9	
New Jersey.....	123	157	157	1								
Pennsylvania.....	78	197	206									
EAST NORTH CENTRAL												
Ohio.....	82	107	168								3	
Indiana.....	38	10	13				1		2		15	
Illinois.....	107	60	102	3	1		5				16	
Michigan *.....	130	56	64		2		1			5	5	
Wisconsin.....	106	30	123						2		9	
WEST NORTH CENTRAL												
Minnesota.....	9	12	39	2							6	
Iowa.....	77	1	24								20	
Missouri.....	6	15	15			1			2			
North Dakota.....	3	2	13									
South Dakota.....			2									
Nebraska.....	2	8	6									
Kansas.....	31	44	46	1							3	
SOUTH ATLANTIC												
Delaware.....		1	3									
Maryland *.....	23	82	82			1		5			1	
District of Columbia.....	9	8	10									
Virginia.....	92	46	103			67		7			1	
West Virginia.....	58	11	23									
North Carolina.....	78	221	184					2	2	2	2	
South Carolina.....	30	53	53	2	13			1	1	5		
Georgia.....	16	31	31		2			1		16	2	
Florida.....	40	15	13	2						26		
EAST SOUTH CENTRAL												
Kentucky.....	19	45	52					3	1			
Tennessee.....	36	24	34		6		1	1	2	1	2	
Alabama.....	14	23	40							10		
Mississippi *.....									1		1	
WEST SOUTH CENTRAL												
Arkansas.....	10	3	16	5	1				3			
Louisiana.....	18	6	13	1						13	2	
Oklahoma.....	29	22	16				2	1			2	
Texas.....	248	243	248	28	580	40	1		2	86	24	
MOUNTAIN												
Montana.....	12	7	15								1	
Idaho.....	13		7			4		1	1		1	
Wyoming.....	14	2	3						1			
Colorado.....	27	35	35		1						1	
New Mexico.....	26	16	16		1							
Arizona.....	11	23	23			8	1				1	
Utah *.....	9	37	67								1	
Nevada.....												
PACIFIC												
Washington.....	22	10	10								1	
Oregon.....	13	13	18			2		1				
California.....	68	321	282	4	2					2	8	
Total.....	2,052	2,364	3,475	69	628	123	17	22	20	111	148	
Same week, 1945.....	2,364			40	488	337	8	14	14	107	132	
Average, 1943-45.....	2,883			67	487	275	9	31	18	70		
26 weeks: 1946.....	47,063			1,017	8,636	2,997	225	154	443	1,265	2,241	
1945.....	62,419			793	10,981	3,097	174	127	310	1,471	2,309	
Average, 1943-45.....	69,507		95,277	795	8,244	2,362	241	159	378	1,204		

\* Period ended earlier than Saturday.

\* 5-year median, 1941-45.

Anthrax: New York 1 case.

Leprosy: California 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended June 15, 1946

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Etiophthalmis, infections, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	4	0	39	0	0	0	5	0	0	4
New Hampshire:												
Concord.....	0	0		0		0	2	0	0	0	0	
Vermont:												
Barre.....	0	0		0		0	0	0	0	0	0	
Massachusetts:												
Boston.....	3	0		0	234	1	9	0	28	0	0	18
Fall River.....	0	0		0	44	0	2	0	2	0	0	1
Springfield.....	0	0		0	98	0	1	0	7	0	1	8
Worcester.....	0	0		0	327	0	6	0	2	0	0	30
Rhode Island:												
Providence.....	0	0	1	0	165	0	0	0	2	0	0	21
Connecticut:												
Bridgeport.....	0	0		0	2	0	0	0	1	0	1	3
Hartford.....	0	0		0	8	0	0	0	2	0	0	5
New Haven.....	0	0		0	51	0	0	0	1	0	1	
MIDDLE ATLANTIC												
New York:												
Buffalo.....	4	0		1	22	0	5	0	7	0	0	6
New York.....	12	1	5	1	591	5	41	2	112	0	0	27
Rochester.....	0	0		0	96	0	6	0	35	0	0	2
Syracuse.....	0	0		0	2	0	1	0	6	0	0	2
New Jersey:												
Camden.....	0	0		0	5	0	0	0	1	0	0	2
Newark.....	0	0		0	80	1	0	0	8	0	0	14
Trenton.....	0	0	1	1	73	0	2	0	1	0	0	1
Pennsylvania:												
Philadelphia.....	2	0		0	109	0	14	1	35	0	0	14
Pittsburgh.....	0	0	1	1	13	1	5	0	14	0	0	6
Reading.....	0	0		0	5	0	0	0	3	0	0	6
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0		0	19	0	5	0	5	0	0	5
Cleveland.....	0	0	1	0	177	2	4	1	32	0	0	11
Columbus.....	0	0	1	1	6	0	3	0	3	0	0	5
Indiana:												
Fort Wayne.....	0	0		0	6	0	0	0	1	0	0	3
Indianapolis.....	0	0		1	13	0	1	0	5	0	0	8
South Bend.....	0	0		0	0	0	0	0	1	0	0	
Terre Haute.....	0	0		0	20	1	1	0	0	0	0	
Illinois:												
Chicago.....	0	0		1	71	3	24	6	62	0	1	35
Springfield.....	0	0		0	3	0	1	0	1	0	0	
Michigan:												
Detroit.....	2	0		0	36	0	10	0	35	0	1	48
Flint.....	0	0		0	5	0	2	0	3	0	0	3
Grand Rapids.....	0	0		0	34	0	0	0	7	0	0	12
Wisconsin:												
Kenosha.....	0	0		0	73	0	0	0	0	0	0	
Milwaukee.....	1	0	1	1	221	1	0	0	4	0	0	43
Racine.....	0	0		0	142	0	0	0	3	0	0	1
Superior.....	0	0		0	3	0	0	0	1	0	0	3
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	1	0		0	10	0	0	0	0	0	0	
Minneapolis.....	3	0		0	14	1	5	0	7	0	0	2
St. Paul.....	0	0		0	6	1	1	0	7	0	0	1
Missouri:												
Kansas City.....	0	0		0	1	0	4	0	4	0	0	8
St. Joseph.....	0	0		0		0	0	0	2	0	0	
St. Louis.....	3	0	1	0	72	1	5	0	6	0	0	2

## City reports for week ended June 15, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyellitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0		0	6	0	2	0	2	0	0	-----
Kansas:												
Topeka.....	0	0		0	-----	0	0	0	0	0	0	6
Wichita.....	0	0		0	13	0	6	0	0	0	0	1
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0		0	1	0	3	0	1	0	0	1
Maryland:												
Baltimore.....	9	0		0	500	2	4	0	11	0	0	18
Cumberland.....	0	0		0	1	0	0	0	4	0	0	-----
Frederick.....	1	0		0	3	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0		0	127	1	10	0	7	0	1	10
Virginia:												
Lynchburg.....	0	0		0	10	0	0	0	0	0	0	-----
Richmond.....	0	0	14	1	49	0	1	0	1	0	1	2
Roanoke.....	0	0		0	9	0	0	0	0	0	0	-----
West Virginia:												
Wheeling.....	1	0		0	-----	0	0	0	0	0	0	31
North Carolina:												
Raleigh.....	0	0		0	4	0	0	0	0	0	0	-----
Wilmington.....	1	0		0	6	0	0	0	0	0	0	3
Winston-Salem.....	0	0		0	7	0	0	0	1	0	0	12
South Carolina:												
Charleston.....	0	0		0	1	0	1	0	0	0	0	1
Georgia:												
Atlanta.....	0	0		0	17	0	0	1	1	0	0	-----
Brunswick.....	0	0		0	2	0	0	0	0	0	0	-----
Savannah.....	0	0		0	8	0	1	0	0	0	0	-----
Florida:												
Tampa.....	2	0	1	0	10	0	0	5	1	0	0	3
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0		0	26	1	6	1	5	0	1	6
Nashville.....	0	0		0	2	0	1	0	1	0	1	1
Alabama:												
Birmingham.....	0	0		0	10	0	3	0	1	0	0	1
Mobile.....	0	0		0	-----	0	1	0	0	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0		0	12	0	0	0	0	0	0	-----
Louisiana:												
New Orleans.....	*8	0	3	0	*42	9	*7	5	4	0	*2	1
Shreveport.....	0	0		0	-----	0	3	0	0	0	0	-----
Texas:												
Dallas.....	2	0		0	7	0	0	3	2	0	0	-----
Galveston.....	0	0		1	1	0	3	0	1	0	0	1
Houston.....	1	0		0	3	0	1	2	2	0	0	1
San Antonio.....	0	0		0	3	0	6	3	0	0	0	1
MOUNTAIN												
Montana:												
Billings.....	0	0		0	3	0	1	0	0	0	0	-----
Great Falls.....	0	0		0	18	0	2	0	1	0	0	-----
Helena.....	0	0		0	1	0	0	0	0	0	0	-----
Missoula.....	0	0		0	5	0	0	0	0	0	0	-----
Colorado:												
Denver.....	4	0	1	0	55	0	1	4	9	0	0	17
Pueblo.....	0	0		0	32	0	1	0	0	0	0	1
Utah:												
Salt Lake City.....	0	0		0	69	0	3	0	2	0	0	3

\*Includes monthly reports from Charity Hospital; figures not used in computing rates.

## City reports for week ended June 15, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	3	0	-----	0	39	1	1	1	4	0	1	2
Spokane.....	0	0	-----	0	7	0	1	0	0	0	0	1
Tacoma.....	0	0	-----	0	1	0	0	0	3	0	0	4
California:												
Sacramento.....	0	0	-----	0	33	0	2	0	1	0	0	-----
San Francisco.....	3	0	-----	0	66	1	7	1	10	0	0	1
Total.....	59	1	31	10	4,063	33	231	36	536	0	10	489
Corresponding week, 1945.....	74	-----	15	12	1,593	-----	257	-----	1,053	2	11	577
Average, 1941-45.....	51	-----	23	11	3,517	-----	283	-----	776	1	18	931

<sup>1</sup> 3-year average, 1943-45.

<sup>2</sup> 5-year median, 1941-45.

\*Includes monthly reports from Charity Hospital.

*Dysentery, amebic.*—Cases: New York 5.

*Dysentery, bacillary.*—Cases: Providence 1; New York 4; St. Louis 1; Baltimore 1; Charleston, S. C., 5; Memphis 1.

*Dysentery, unspecified.*—Cases: San Antonio 14.

*Rocky Mountain spotted fever.*—Cases: Missoula 1.

*Tularemia.*—Cases: Memphis 1.

*Typhus fever, endemic.*—Cases: Tampa 1; New Orleans 5; \* Galveston 1; Houston 2.

*Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 32,559,900)*

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	7.8	0.0	2.6	0.0	2,530	2.6	52.3	0.0	131	0.0	7.8	235
Middle Atlantic.....	8.3	0.5	3.2	1.9	461	3.2	34.3	1.4	103	0.0	0.0	37
East North Central.....	2.4	0.0	1.8	2.4	504	4.3	31.0	4.3	99	0.0	1.2	108
West North Central.....	14.1	0.0	2.0	0.0	245	6.0	46.3	0.0	56	0.0	0.0	40
South Atlantic.....	23.4	0.0	25.1	1.7	1,264	5.0	33.5	18.0	45	0.0	3.3	136
East South Central.....	0.0	0.0	0.0	0.0	224	5.9	64.9	5.9	41	0.0	11.8	47
West South Central.....	8.6	0.0	8.6	2.9	75	25.8	37.3	37.3	26	0.0	0.0	11
Mountain.....	33.0	0.0	8.3	0.0	1,512	0.0	66.1	33.0	99	0.0	0.0	173
Pacific.....	19.6	0.0	0.0	0.0	477	6.5	35.9	6.5	59	0.0	3.3	26
Total.....	9.5	0.2	5.0	1.6	652	5.3	37.1	5.8	86	0.0	1.6	79

# **PLAGUE INFECTION IN ORANGE AND SAN LUIS OBISPO COUNTIES, CALIF.**

Plague infection was reported, under date of June 10, to have been proved on June 7 in specimens taken in San Luis Obispo County, Calif., as follows: A pool of 178 fleas received at the laboratory on May 3, taken from burrows 1 mile north of Pozo; a pool of 200 fleas received at the laboratory on April 26, from burrows 2 miles north of Pozo; a pool of 400 fleas received at the laboratory on April 22, taken from burrows 4 miles south and 1 mile east of Atascadero; a pool of

512 fleas from 90 ground squirrels, *C. beecheyi*, received at the laboratory on April 26, from a ranch 2 miles west and 4 miles north of Pozo; a pool of 200 fleas from 16 ground squirrels, *C. beecheyi*, received at the laboratory on April 25, collected 2 miles west of Pozo. Under date of June 17, plague infection was reported proved, on June 12, in a pool of 200 fleas received at the laboratory on May 3, collected from burrows 1 mile north of Pozo, and in a pool of 107 fleas from 7 ground squirrels, *C. beecheyi*, received at the laboratory on April 25 from a ranch 11 miles south and 1 mile west of Santa Ana, Orange County, Calif.

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended May 25, 1946.*—During the week ended May 25, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		29		197	232	10	25	30	88	611
Diphtheria.....		5		13	6	5	2	1		32
Dysentery, bacillary.....				6						5
Encephalitis, infectious.....								1		1
German measles.....				38	44		2	15	4	103
Influenza.....		1		6	6				6	13
Measles.....		65	3	804	659	45	19	191	11	1,797
Meningitis, meningococcus.....									1	1
Mumps.....			1	90	307	69	33	61	149	710
Poliomyelitis.....				1				1		2
Scarlet fever.....		9	10	130	35	11	2	2	20	219
Tuberculosis (all forms).....		4	8	111	46	12	8	84	38	311
Typhoid and paratyphoid fever.....				7	1				12	20
Undulant fever.....					2					2
Venereal diseases:										
Gonorrhea.....	2	13	15	53	84	28	37	63	128	423
Syphilis.....	2	15	4	88	75	11	11	9	56	266
Whooping cough.....				57	80	1		7	3	148

### FINLAND

*Notifiable diseases—April 1946.*—During the month of April 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	23	Paratyphoid fever.....	206
Diphtheria.....	788	Poliomyelitis.....	8
Dysentery.....	21	Scarlet fever.....	262
Gonorrhea.....	1,375	Syphilis.....	580
Malaria.....	2	Typhoid fever.....	37

### JAMAICA

*Notifiable diseases—4 weeks ended June 1, 1946.*—During the 4 weeks ended June 1, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis.....		1	Puerperal sepsis.....		1
Chickenpox.....	1	24	Scarlet fever.....	1	
Diphtheria.....	1	2	Tuberculosis (pulmonary).....	7	44
Dysentery (unspecified).....		1	Typhoid fever.....	10	119
Erysipelas.....	2		Typhus fever (murine).....	3	
Leprosy.....		3			

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

#### Cholera

*Indochina (French)—Cochinchina.*—For the period May 11–20, 1946, 109 cases of cholera were reported in Cochinchina, French Indochina.

*Thailand (Siam).*—For the week ended May 25, 1946, 238 cases of cholera, including 18 cases in Bangkok, were reported in Thailand.

#### Plague

*Egypt.*—For the week ended June 18, 1946, plague was reported in Egypt as follows: Alexandria, 8 cases, 3 deaths; Suez, 4 cases.

*Indochina (French)—Cochinchina.*—For the period May 11–20, 1946, 1 case of plague was reported in Cochinchina, French Indochina.

#### Smallpox

*Nigeria.*—Smallpox has been reported in Nigeria as follows: Weeks ended—March 16, 1946, 364 cases, 49 deaths; March 23, 1946, 490 cases, 70 deaths; March 30, 1946, 401 cases, 67 deaths.

*Thailand (Siam).*—For the week ended May 25, 1946, 771 cases of smallpox, including 2 cases in Bangkok, were reported in Thailand.

#### Typhus Fever

*Straits Settlements—Malacca.*—For the week ended June 15, 1946, 5 cases of typhus fever were reported in Malacca, Straits Settlements.

#### Yellow Fever

*Colombia—Santander Department—Municipality of La Paz—Cachipay.*—For the period January 1 to February 28, 1946, 1 death from yellow fever was reported in Cachipay, Municipality of La Paz, Santander Department, Colombia.





FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

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# Public Health Reports

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### PREVALENCE OF DISEASE

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# Public Health Reports

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## STUDIES ON MARIHUANA AND PYRAHEXYL COMPOUND<sup>1</sup>

By EDWIN G. WILLIAMS, *Senior Surgeon*; C. K. HIMMELSBACH, *Senior Surgeon*;  
ABRAHAM WIKLER, *Surgeon (R)*; and DOROTHY C. RUBLE, *Psychologist*; with  
the technical assistance of BOLIVAR J. LLOYD, JR., *Scientific Aide*; *United  
States Public Health Service*

Recently there has been increased interest concerning the effects of marihuana. The Mayor of New York appointed a committee to investigate the problem in that city and a report of its studies has been published (1). These studies included examinations of synthetic substances developed by Professor Roger Adams at the University of Illinois. Through the courtesy of Dr. Adams this hospital was supplied with a quantity of one of these substances called pyrahexyl compound, which had been found to produce effects qualitatively similar to those produced by marihuana. The development of pyrahexyl compound gives the advantage of a substance which, if pharmacologically identical with marihuana, would lend itself admirably to studies of the marihuana problem, since dosage could be controlled. Aldrich (2) observed its influence on musical appreciation and Himmelsbach (3) evaluated its effect on the morphine abstinence syndrome. The results of both of these studies showed that pyrahexyl compound had no beneficial effect.

This paper deals with pharmacological, neurophysiological, psychiatric, and psychological studies<sup>2</sup> made on subjects ingesting pyrahexyl compound or smoking marihuana cigarettes.

### Pyrahexyl Compound

#### Clinical Studies

##### Methods

Six prisoner patients who had formerly used marihuana were chosen for the pyrahexyl compound study involving prolonged use of the drug. They were quartered in the research ward of the institution

<sup>1</sup> From the Bureau of Medical Services, Research Department, U. S. Public Health Service Hospital, Lexington, Ky.

<sup>2</sup> The body hydration studies were made by Harris Isbell, Surgeon; psychiatric observations were made by James V. Lowry, Senior Surgeon, both of the U. S. Public Health Service.

in groups of 2, along with 8 or 10 patients undergoing studies concerning the effects of morphine. The fact that they were in the minority and the fact that there was mild antipathy between morphine users and marihuana users, is mentioned because it might have modified some of the psychological reactions observed in this group. Observations on temperature, pulse, respiration, body weight, caloric intake, and sleep were made three times daily for a 7-day period of preliminary observation, throughout the time they were taking the drug, and for a 7-day period following the discontinuation of the drug. Patients were observed at half-hour intervals throughout the 24 hours. If they were apparently sleeping on two consecutive observations they were credited with one-half hour of sleep. Pyrahexyl compound was given in self-chosen doses at self-chosen intervals for periods of from 26 to 31 days. The daily dose ranged from 60 to 2,400 mg. and was taken orally in from one to eight individual doses. The number of doses per day was not related to the total daily amount, one patient taking 1,200 mg. in one dose (the total for that day). Two men skipped one day each near the middle of the study.

#### *Description of Patients*

The six patients were between the ages of 26 and 33. None gave a history of having been physically dependent on opiates. All but one had used various narcotic drugs for pleasure.

All reported having smoked marihuana for periods of from 2 to 10 years with intervals of abstinence either enforced or voluntary. Five of the group were American-born citizens and one was a Puerto Rican. One had attended college 4 years, one for 2 years, two had graduated from high school, one had quit school at the eighth grade, and the school history on the Puerto Rican was vague.

Of these patients, one was a musician who had been employed regularly, one a professional dancer, two were salesmen, one was a laborer, and one a cook. All gave histories of having started using marihuana through associating with individuals who smoked it. They all stated that they could take it or leave it alone without discomfort.

#### *Clinical Observations*

About 3 hours after the initial dose there was drowsiness, euphoria, dryness of the mouth, injected sclerae, increased appetite, and swollen eyelids. There was spontaneous laughter, and some of the patients became markedly euphoric and garrulous. There was no gross ataxia. In all instances, there was dilatation of the pupils. At this time the men reacted slowly to questions and there was some apparent difficulty in expressing their thoughts. Most of them reported that this drug was similar in action to, but stronger than marihuana but stated that they preferred marihuana cigarettes. After the first 2 or 3 days the patients all showed loss of interest in their surroundings.

and were unable to concentrate on any one thing for any appreciable length of time. After 4 to 6 days most of them seemed to be somewhat less affected by the drug than they had been on the first day or two. At this time all the patients asked for an increase in medication. This increased dosage was followed by a return of the effects. In one individual, on the twentieth day, the dosage was stabilized at 1,200 mg. per day, following which there was progressively less effect from the drug. One patient made it a point to remain semistuporous throughout the entire study. He stated that he would like to take the drug indefinitely. One patient who was usually hostile and irritable was happy and satisfied only when he was semistuporous. As the experiment progressed the patients became increasingly lethargic. In some individuals there were jerking movements during sleep. Toward the end of the study most of the patients complained of headache, dryness of the mouth, fatigue, and irritability in the early morning. At the end of the period of medication some of them stated that they would prefer staying on the drug for a longer period of time.

When administration of the drug was abruptly discontinued there was little evidence of abstinence during the first 2 days. On the third day, however, most of the patients became restless, slept poorly, had poor appetites, and reported "hot flashes." There was increased perspiration, and two individuals reported difficulty in swallowing. The reactions of two of the patients deserve detailed description. One (No. 635 of the marihuana study) exhibited evidence of a panic reaction. During the second day of withdrawal he was observed to tremble from time to time as though he were having a chill. He was markedly agitated, fearful, restless, and slept little. He became progressively worse and on the third day he was disoriented as to time and place. He exhibited marked mood swings, chewed his finger nails, cried, and complained of inability to swallow. These symptoms were abolished by pyrahexyl compound but returned after 4 or 5 hours. On the fourth day he lost emotional control, screamed, cried, and demanded his release. He was given successively 10 mg. of morphine, 3 gr. of nembutal, 120 mg. of pyrahexyl, 3 gr. of luminal and finally 20 mg. of morphine before this reaction was brought under control. He was discharged from the study on the eighth day after withdrawal but was readmitted to the research ward for a period of observation because of continued anxiety. He remained on the ward at this time for a period of 3 days, during which his symptoms subsided without any special treatment. The other developed a hypomanic reaction which reached its maximum on the fourth day of withdrawal. This was characterized by overactivity, euphoria, increased psychomotor activity taking the form of dancing about by himself, bowing, singing, and effusive greeting which continued for 24 hours and was enhanced by smoking three marihuana cigarettes. This reaction had subsided completely by the eighth day after withdrawal.



Several measurable phenomena are plotted in figure 1. The average rectal temperature was lower during the administration of pyrahexyl compound than during the preliminary observation period. After withdrawal of the drug it returned to the control level. Pulse rate, after the initial rise, was definitely below the control level. After withdrawal it returned to the control level. Respiratory rate was definitely lower during the period of taking pyrahexyl than during the preliminary observation period and was not significantly altered following withdrawal. Systolic blood pressure was not altered during the period of pyrahexyl medication. The average body weight increased during the period of medication and returned to the control

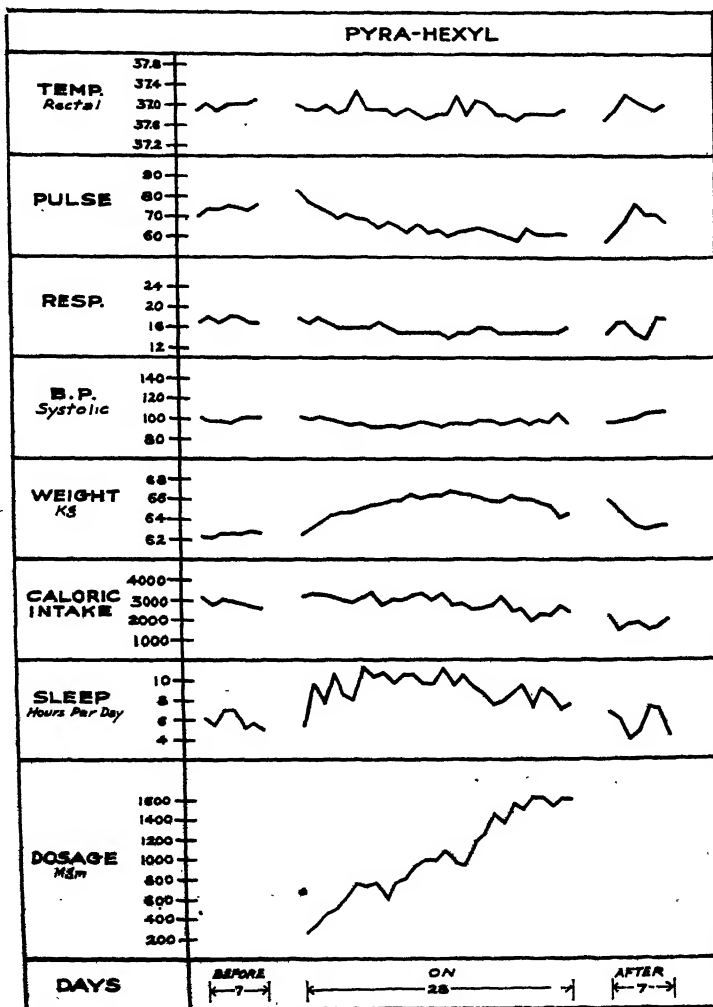


FIGURE 1.—Effect of continued pyrahexyl compound medication on physiological functions. (See text for discussion.)

level following withdrawal of the drug. Caloric intake increased slightly at the beginning of the period of medication and then decreased slightly but progressively until the end of the study, the caloric intake during the 7-day period following withdrawal being simply a continuation of the general decline seen from the beginning of the medication. Sleep was increased during pyrahexyl administration, particularly during the early part. During the latter part of the period of medication it became progressively less. After the drug was discontinued the hours of sleep were not significantly different from the control period. It is also noteworthy that the drug was taken in rapidly increasing amounts throughout the entire period, in accordance with the requests of the patients.

### Psychological Studies

#### *Methods*

Certain psychological tests were given during the preliminary observation period, 2 weeks after medication was begun, and on the third day after it was discontinued. The tests used were:

Rorschach.

Wechsler-Bellevue.

Tapping speed.

Minnesota mechanical ability test.

Memory for digits (forward and backward).

All tests were given when there was subjective and objective evidence of the effects of the drug. In addition to the above tests the behavior rating scale devised by Felix (4) was used. This is a graphic type of rating scale in which the following six aspects of behavior are rated: Appearance, motor activity, mood, cooperation, speech, and herd.

#### *Results*

Rorschach analyses prior to the study indicated that these individuals were constricted, insecure, tense, and anxious. They had feelings of inadequacy and were emotionally immature. This type of Rorschach pattern is typical of the psychopath. Two of the six were extremely unstable emotionally; one of these had a schizoid personality with evidence of paranoid trends.

Analyses of the Rorschach records given during medication showed changes in the direction of a lessening of inhibitions and constrictions.

Pyrahexyl impaired intellectual functioning, but not to a marked degree. Total scores of the Wechsler-Bellevue showed little change. Analyses of results revealed difficulty in focusing attention upon the current topic and excluding other emotional content. Subjective reports are in disagreement with these findings. Subjects reported that it was easier to think, that the task seemed easier, that they were sure it improved their scores. The drug had little, if any, effect on rote memory. There was an increased output on tests involving

psychomotor activity but a loss in accuracy. Behavior rating data showed few changes in appearance or cooperation, except that patients who, during the preliminary observation period had been rather negativistic, became quite pleasant and cooperative. Motor activity on the whole decreased and they spent much time in bed. When awake they would talk for hours in a way suggestive of free association. Mood changes were in a positive direction and they were quite gregarious, trying to find anyone who would listen to them talk.

They stated that they were quite "high" but at no time was this fact grossly obvious.

### Electroencephalographic Studies

The effects on the electroencephalogram of single doses and continued medication with pyrahexyl compound were studied in four and five patients respectively. All had been experienced marihuana users. The group on continuous pyrahexyl compound medication was the same as that described in previous sections of this report.

### Methods

Standard electroencephalographic technique was employed. In the studies on the effects of continued pyrahexyl compound medication bipolar and monopolar leads were taken from the standard placements in the frontal, precentral, parietal, and occipital regions. In the single-dose studies bipolar and monopolar leads were taken from the occipital region only. The reference electrode for the monopolar recordings was placed on the ear. The electroencephalogram was a 4-channel resistance-capacity amplifier-oscillograph system with photographic recording on bromide paper. All recording was done in a darkened, air-conditioned, electrically shielded, soundproofed room, with the patient recumbent on a comfortable bed. Movements were recorded by an observer who also exercised special care to prevent the subject from sleeping. In analyzing the records a representative 100-cm. (28.6 sec.) strip was selected and all waves over 5 microvolts were studied. Frequencies were measured only in groups of 3 or more similar waves. The average of 10 such measurements was taken as the mean frequency of the waves under consideration. Alpha frequencies and alpha percentages were calculated from bipolar occipital leads in all cases. The average deviation of the alpha frequency in any single record was found to be plus or minus 0.7 cycle per second. The average deviation of alpha percentage (the percent time that rhythms of alpha frequency are present) in any single record was approximately 12 percent.

In the single-dose studies control records were taken before the administration of the drug and the electrodes were left in place on the scalp. Pyrahexyl compound was then administered orally, and the patients were observed until it was apparent objectively that the drug had exerted its maximal effect, as evidenced by injection of the sclerae,

change in mood, talkativeness, and other alterations in behavior. This generally occurred 3 to 4 hours after ingestion of pyrahexyl compound. Electroencephalograms were then taken again, after readjustment of the electrode resistances to their control value. In the continued-dose studies electroencephalograms were made at various times during the day, but always after the patient had taken several doses of pyrahexyl that day.

### Results

*Single doses.*—The effects of single doses of 120 and 30 mg. of pyrahexyl compound are shown in table 1. In six of the eight experiments, the alpha frequency did not change significantly. In the remaining two, the changes were in opposite directions. In four of the eight experiments the alpha percentage dropped significantly and in none of the remaining four was there a significant increase. In four of the experiments there was a definite although moderate increase in muscle activity recorded from monopolar leads. A typical record is shown in figure 2.

TABLE 1.—*Effects of single doses (120 and 30 mg.) of pyrahexyl compound on alpha frequency and alpha percentage of electroencephalogram*

Subject No.	Control		After pyrahexyl compound		
	Alpha frequency	Alpha percentage	Dose (mg.)	Alpha frequency	Alpha percentage
687	10.0	49	120	10.0	43
687	9.5	53	30	11.2	33
688	10.7	50	120	10.9	20
688	10.3	74	30	10.6	56
689	12.3	21	120	10.6	26
689	11.2	39	30	11.5	48
690	8.8	90	120	9.2	63
690	9.0	57	30	9.4	64

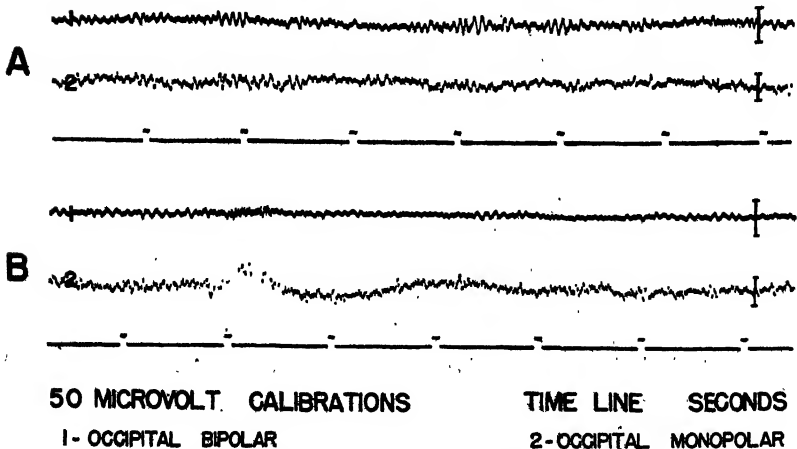


FIGURE 2.—Effects of single doses (120 mg.) of pyrahexyl compound on electroencephalogram. A. Control record. B. Three hours after oral administration of pyrahexyl compound. Note moderate increase in muscle activity recorded from monopolar leads.

*Continued medication.*—The electroencephalographic changes observed during continued pyrahexyl medication are shown in table 2.

TABLE 2.—*Effects of continued pyrahexyl medication on alpha frequency and alpha percentage of electroencephalogram*

Subject No.	Control		During continued pyrahexyl medication			
	Alpha frequency	Alpha percentage	Days on pyrahexyl	Dose level (mg. per day)	Alpha frequency	Alpha percentage
596	10.6	70	12	900	8.7	60
593	12.2	37	13	1,560	12.0	27
606	11.0	16	7	360	9.0	7
606			27	2,400	0	0
					(continuous delta)	
605	10.8	63	7	360	9.9	68
605			27	2,400	9.2	79
583	10.0	96	29	1,800	9.9	59

In three of the five subjects there was significant diminution in alpha frequency. The alpha percentage was increased in one and decreased significantly in two subjects, while in the remaining two the changes were within the limits of experimental error (i. e., less than 12 percent). In one (subject No. 606) of the two cases in which there was a diminution in alpha percentage the alpha was replaced by delta activity,

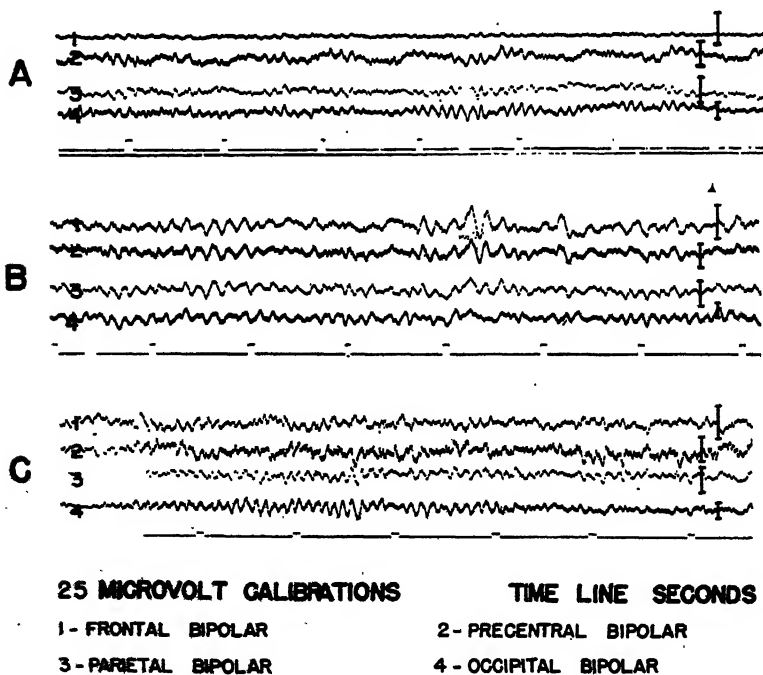


FIGURE 3.—Effects of continued pyrahexyl compound medication on electroencephalogram. A. Control. B. Twelfth day of continuous medication (dose level—900 mg. per day). C. Fourth day of withdrawal. Note marked slowing of dominant frequencies (4 to 6 per second) in B, and return to approximately normal pattern in C.

while in the other there was no replacement. Considerable delta activity also appeared in one record (subject No. 596) in which there was no significant over-all change in alpha percentage. A sample of this record is shown in figure 3. It is noteworthy that on the fourth day of withdrawal the electroencephalogram returned to the control pattern. Records taken 5 days after discontinuation of the medication in the other cases showed a complete restoration to the control pattern. Except for a transient increase in one case, muscle activity was not significantly altered during the test period.

## Marihuana

Since there was some question as to whether the pyrahexyl compound was pharmacologically identical with marihuana, and especially since there was some evidence which might be interpreted as indicating physical dependence on the pyrahexyl compound, the study was continued using marihuana cigarettes instead of the pyrahexyl compound.

### Clinical Studies

#### Methods

The marihuana was supplied by the Bureau of Narcotics, Washington, D. C. Its potency was not assayed, but the patients, all of whom were familiar with marihuana cigarettes, stated after smoking that it was "good weed." The ward routine was similar to that used in the first part of this study except that the ward was cleared of all patients other than those in the marihuana study. There was a 7-day period of preliminary observation, a 39-day period of marihuana smoking, and a 7-day period of postsmoking observation. Six patients were used for this portion of the study, three of whom had been subjects in the pyrahexyl study.

#### Description of Patients

*Patient No. 635 (also a subject in the pyrahexyl study).*—This 26-year-old white male was reared by an overindulgent, overprotective mother. At the age of 18 he began using morphine, but there is no definite evidence that he developed physical dependence. He was hospitalized later because of a schizophrenic illness for which he received shock therapy and was discharged after 1 year of hospitalization. At the age of 21 he was again hospitalized for 3 months because of alcoholism. Subsequent to this he occasionally used morphine and marihuana. He was an irritable individual, seclusive, defensive, cynical, manneristic, and above the average in intelligence. Impression: Emotionally unstable, schizoid individual, with definite paranoid trends.

*Patient No. 638 (also a subject in the pyrahexyl study).*—This 33-year-old white male was enuretic until the age of 11. He began a nomadic existence at the age of 14 when he left home because of

quarreling with his father. He had an interest in literature, music, and art, and at the age of 19 became a professional musician. He had been using marihuana since the age of 22. Although there is no history of overt homosexual behavior, he had definitely effeminate mannerisms of gait and speech. He became angry easily but met such situations by retreat. He appeared to be of about average intelligence. Impression: Psychopathic personality, emotional immaturity.

*Patient No. 637 (also a subject in the pyrahexyl study).*—This 27-year-old white male left home at the age of 15 and became a theatrical entertainer. He had been successful and saved part of his earnings. He was married three times, the first and second marriages being terminated by divorce. He began smoking marihuana at the age of 24 and continued until the time of his present hospitalization. He had taken an occasional injection of morphine, codeine, and heroin, but was never addicted. Impression: Psychopathic personality, emotional immaturity.

*Patient No. 634.*—This 24-year-old white male was a product of a broken home. His father was a bootlegger and the patient was raised by an aunt after the father was sent to prison. He had always earned his living by illegitimate means. He smoked marihuana for 4 years prior to admission to this institution and used morphine intravenously, intermittently, for 2 years prior to admission. He was an emotionally immature, pleasure-seeking individual. Impression: Psychopathic personality, emotional immaturity.

*Patient No. 636.*—This 26-year-old white male grew up in an intact home of marginal economic level. He left school at the age of 14 and worked as a salesman. He began the use of marihuana at the age of 15 and continued to smoke it until the time of his present commitment. He had taken a few injections of morphine and heroin. This patient was an emotionally immature, pleasure-seeking individual who had never assumed any social responsibility. Impression: Psychopathic personality, emotional immaturity.

*Patient No. 639.*—This 32-year-old white male had an antisocial criminal record which began at the age of 13. Most of his convictions were for burglary. He left home at the age of 18 and it was at this time that he began smoking marihuana. He had a history of homosexual activity. This man was a pleasure-seeking, irresponsible individual. Impression: Psychopathic personality, with antisocialism.

#### *Clinical Observations*

During the first few days of smoking marihuana the effects consisted of signs of exhilaration—the subjects became more talkative, there was an increase in psychomotor activity, they grinned and laughed a great deal, and one patient danced and waltzed about by himself. One patient became nauseated and vomited, but this did not seem to detract from his euphoria. Pupils were dilated, the

sclerae were injected and moist. Some of the group reported headaches, which they attributed to seeds ground up in the marihuana. One patient (No. 635), who was irritable and seclusive during the initial week of observation, became pleasant and seemed to take great pleasure in being agreeable with others. All had difficulty in concentration on any one thing for any appreciable length of time. They all had dry mouths and irritated throats. After this initial period of increase in activity all subjects showed decreased activity which persisted throughout the period of smoking. They were indolent, nonproductive, and showed neglect of personal hygiene. During periods of exhilaration they showed evidence of a mildly confused type of lassitude and their conversation was voluble and somewhat circumstantial at times. There was no gross interference with coordination; they all played ball in the yard, threw the ball hard and accurately, and caught it consistently. There was no hangover on awakening in the morning. One patient, who was given a work assignment in order to determine the effect of smoking marihuana on his work, lost interest and stopped work early in the experiment. Another, who styled himself as a painter in oils, brought with him some work which he said he would complete while undergoing the study. After the first day he abandoned his painting. Another patient, the musician, had stated that during the study he intended to do a great deal of practicing, but did practically none for the entire period of the study and stopped playing in the institution orchestra. During the last week of the smoking all the patients stated they would be glad when the study ended. One patient voluntarily limited his smoking to one marihuana cigarette during the last day of the period.

The period of smoking was stopped suddenly and completely and there were no objective signs of an abstinence syndrome. All of the patients reported that they were more "jittery" but this was not observed by any of the nurses or doctors. None of these patients showed any evidence of a toxic or other psychosis either during the smoking period or following cessation of smoking.

Certain objectively measurable phenomena are plotted in figure 4. Rectal temperature was increased slightly during the period of smoking as compared to the control period. After smoking it returned to the control level. The pulse rate was increased for the first 3 weeks of the smoking period, after which the rate was not significantly different from that of the preliminary period. After withdrawal no change in pulse rate was noted. Respiratory rate was not definitely affected by smoking. Systolic blood pressure was slightly increased during the period of smoking and this increase was maintained after withdrawal. Body weight increased during the period of smoking and returned to the control level following cessation of smoking.



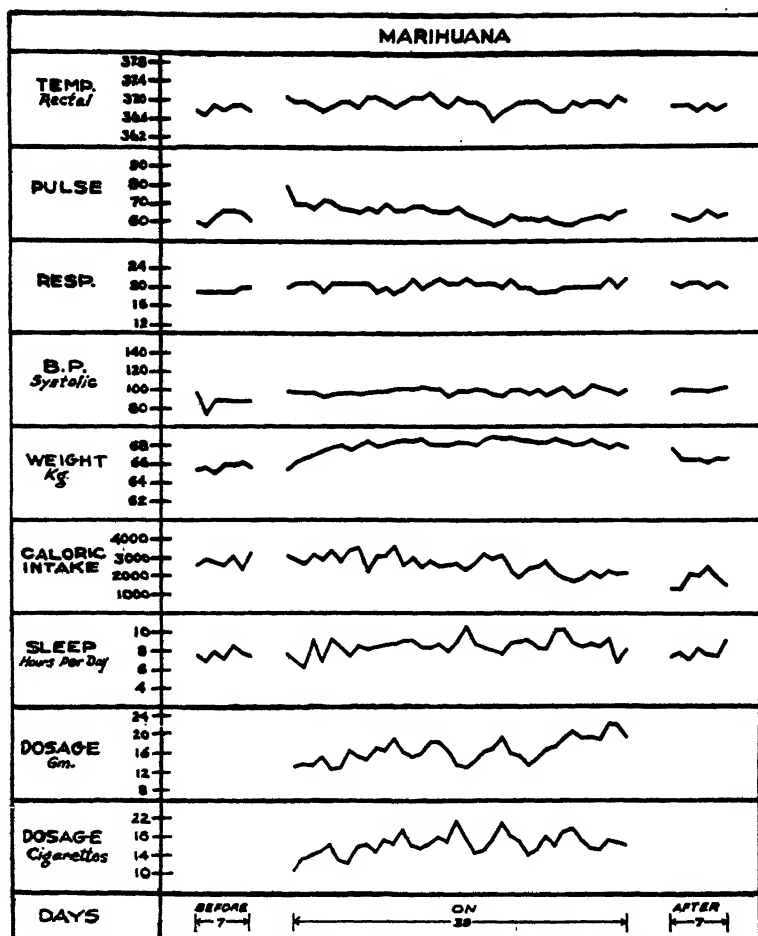


FIGURE 4.—Effects of daily smoking of marihuana cigarettes on physiological functions. (See text for discussion.)

Caloric intake increased slightly at the beginning of the period of smoking, then decreased gradually but progressively until the end of the study. The patients slept more during the period of smoking than during either the preliminary or postsmoking observation period. As to dosage, there was gradual fluctuating increase in smoking as the study progressed. With the exception of one man who smoked 1 cigarette per day, the number ranged from 9 to 26, with an average of 17 cigarettes per day.

#### Body Hydration Studies

##### Methods

Body hydration studies were made because of the observed increases in body weight without concomitant increase in caloric intake in the pyrahexyl studies.

Plasma volumes were determined by the method of Gibson and Evelyn (5); thiocyanate fluid volume by the method of Crandall and Anderson (6); hemoglobin by the method of Evelyn (7); hematocrits by the method of Wintrobe and Landsberg (8); blood and plasma specific gravity, and blood and plasma water according to the method of Williams (9). Total blood volume was calculated from the plasma volume and hematocrit readings. The extravascular (or extracellular) thiocyanate fluid volume was calculated by subtracting the total blood volume from the thiocyanate fluid volume. The results for plasma, blood, thiocyanate, and extravascular thiocyanate fluid volumes are all expressed in terms of milliliters per kilogram of body weight. Determinations were carried out in the week prior to smoking marihuana, 16 to 28 days after beginning to smoke marihuana, and 3 to 5 days after discontinuing smoking.

### Results

Mean values of plasma, blood, and thiocyanate fluid volumes for the entire group are shown in table 3. No significant changes were found

TABLE 3.—*Effects of smoking marihuana cigarettes on plasma volume, blood volume, and thiocyanate fluid volume*

Period	Milliliters per kilogram of body weight		
	Plasma volume	Blood volume	Thiocyanate fluid volume
Before smoking.....	46.3 1 ±5.29	88.3 1 ±10.23	270.4 1 ±15.6
While smoking.....	43.08 1 ±5.28	87.6 1 ±5.23	261.9 1 ±27.6
After smoking.....	46.18 1 ±3.05	88.7 1 ±5.15	278.3 1 ±31.8

<sup>1</sup> Standard deviations.

in these measures or in the other measures studied, regardless of whether the results were considered for individuals or for the entire group.

### Psychological Studies

#### Methods

The following tests were given during the preliminary observation period, 2 weeks after smoking was begun, and on the third day after it was discontinued:

Rorschach.

Revised Stanford-Binet Scale (Form L).

MacQuarrie Test for Mechanical Ability.

Seashore Measure of Musical Talents.

Muller-Lyer Illusion Test.

At the second testing period all tests were given when there were subjective and objective evidences of the effect of marihuana smoking.

### Results

Rorschach analyses prior to smoking marihuana indicated that these individuals were immature and constricted—Rorschach patterns typical of the psychopath. One had a schizoid personality with paranoid trends.

Analyses of tests given during medication showed changes in the direction of lessening of inhibitions, and constriction. There were fewer responses but these were more carefully elaborated. More original responses were given and more scoring determinants were used, especially in the bright-color area.

Marihuana impaired intellectual functioning as measured by the Stanford-Binet test. The following results are shown in terms of mean mental age: Before smoking, 16-8; while smoking, 16-2; after smoking, 16-10.

Analysis of data showed a greater scatter while on marihuana. Although the difference of 6 months between periods one (before smoking) and two (while smoking) was not great it was in the opposite direction from expectation on the basis of practive effects. The differences of 2 months between periods one (before smoking) and three (after smoking) were much less than would be expected on the basis of repetition.

During the second period (while smoking) easy items which previously had been answered correctly were missed, and items which before had given difficulty were answered correctly. This was probably due to the fact that difficult questions were remembered and the correct answers obtained from group discussions (this fact was later admitted), while easy items were missed because the individual was careless and found it difficult to concentrate and attend to the task at hand.

Performance on those subtests of the MacQuarrie Test for Mechanical Ability in which speed alone was the factor showed an increase. Loss in accuracy occurred in those tests in which coordination and manual skill were necessary.

The Seashore Measure of Musical Talents measures discriminations in differences in pitch, loudness, rhythm, time, timbre, and tonal memory. No improvement in musical ability was observed. The total number of errors for the three test periods was as follows: Before smoking, 741; while smoking, 790; after smoking, 757. Individual scores were consistent with these findings. However, all subjects reported that they thought their performances were better during the smoking period. Similar results have been reported by Aldrich (2).

In the Muller-Lyer Illusion Test the subject adjusts a variable line with diverging arrow points to equal a standard line with converging arrow points. The converging arrow points have a shortening effect and so the variable line is judged shorter than the standard.

Marihuana affected the judgment of the variable line. During the first and third period judgments consistently were too short. During the second period they were at times much too short and at others too long. Judgments were inconsistent, indicating carelessness on the part of the subject and no real attempt to make correct judgments. This represented a complete change in attitude on the part of the subjects, for during the other test periods they appeared to feel challenged by the task and made judgments carefully, adjusting and readjusting the variable line.

### Neurophysiologic Studies

#### *Effects of Smoking Marihuana Cigarettes on the Electroencephalogram*

The effects of smoking 1 to 4 marihuana cigarettes on the electroencephalogram were studied in 22 experiments on 18 subjects. In addition, the electroencephalographic changes occurring during continued daily smoking of marihuana cigarettes were observed in 6 subjects.

#### *Methods*

The electroencephalographic technique was identical with that described in the pyrahexyl compound studies. In the single-dose studies, control records were taken and the patients were given one or more marihuana cigarettes and permitted to smoke them in the manner to which they were accustomed. Subsequent records were taken after the effects of the drug were manifest objectively by change in mood and behavior and injection of the scleral conjunctivae. Ten to sixty minutes elapsed between cessation of smoking and the recording of the electroencephalogram. In the continued daily smoking studies the records were taken some time during the day, after the patient had smoked several cigarettes at his usual rate.

#### *Results*

The effects of smoking marihuana cigarettes on alpha frequency are shown in figure 5. It is apparent that no significant uniform change

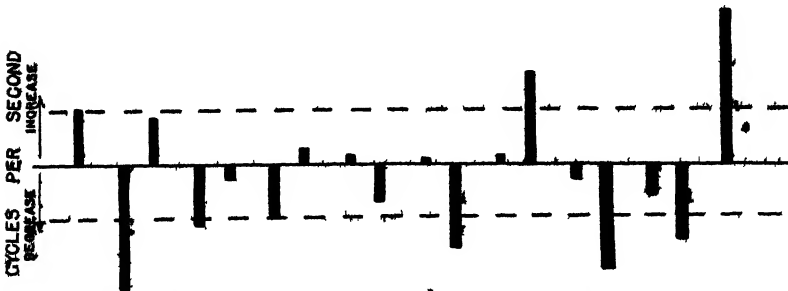


FIGURE 5.—Effects of smoking marihuana cigarettes (single studies) on alpha frequency of electroencephalogram. The broken line represents the average deviation from the mean in any single record. Note absence of any consistent significant effect.

occurred. The effects on the alpha percentage, however, were more significant and uniform, an average decrease of 19 percent being observed in eight cases while in only one instance was it increased (fig. 6). In all cases muscle activity recorded from monopolar leads was enhanced after smoking marihuana (fig. 7).

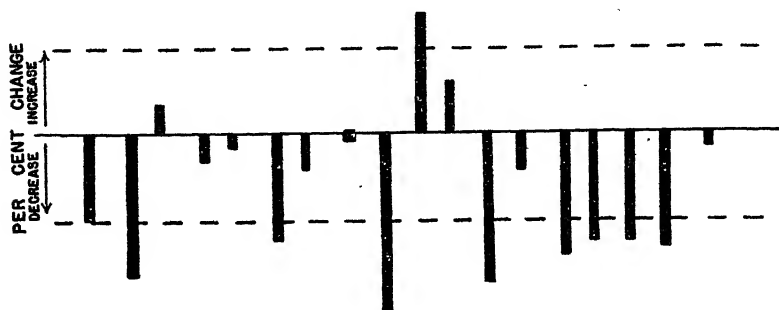


FIGURE 6.—Effects of smoking marihuana cigarettes (single studies) on alpha frequency of electroencephalogram. The broken line represents the average deviation from the mean in any single record. Note trend toward reduction in alpha percentage.

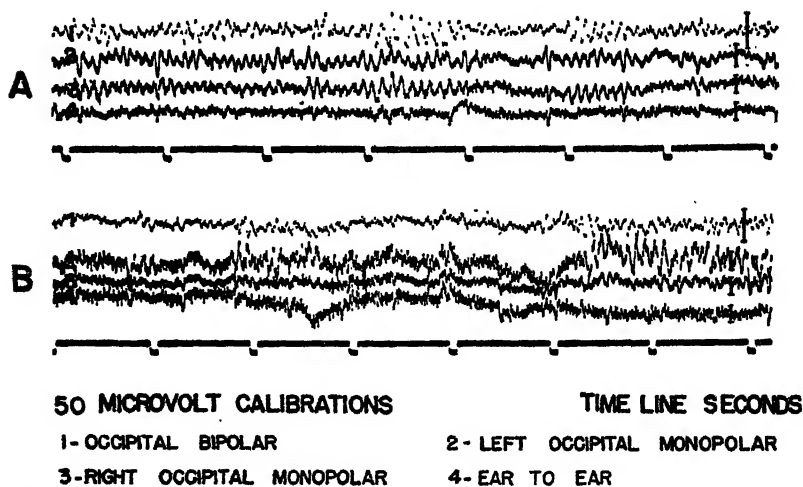


FIGURE 7.—Effects of smoking marihuana cigarettes (single studies) on electroencephalogram. A. Control. B. After smoking 3 marihuana cigarettes. Note reduction in alpha percentage and marked increase in muscle potentials recorded from monopolar leads.

The effects of continued daily smoking of marihuana on the electroencephalogram are shown in table 4. It is noted that in only one instance was the alpha frequency altered significantly. The changes in alpha percentage were not uniform, three showing significant increases and two decreases. Muscle activity was not markedly increased during continuous smoking of marihuana cigarettes (fig. 8).

Since the most striking change occurring after smoking 1 to 4 marihuana cigarettes (single studies) was the increase in muscle

TABLE 4.—*Effect of continued daily smoking of marihuana cigarettes on alpha frequency and alpha percentage of electroencephalogram*

Subject No.	Control		During continued marihuana smoking period			
	Alpha frequency	Alpha percentage	Days on marihuana	Number of cigarettes daily	Alpha frequency	Alpha percentage
634	9.5	45	36	17	9.0	79
638	8.8	46	34	17	8.9	47
636	8.8	80	35	11	9.3	58
639	12.0	40	29	14	11.5	66
635	10.8	63	7	10	10.3	82
637	10.0	96	34	9	7.5	77

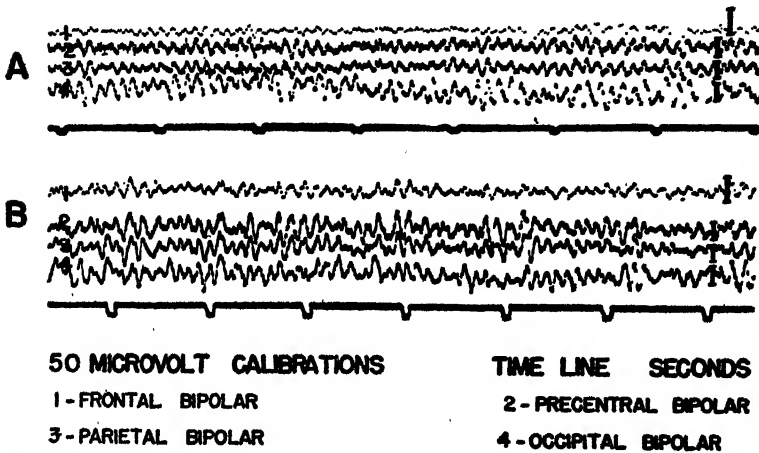


FIGURE 8.—Effects of continuous smoking of marihuana cigarettes on electroencephalogram. A. Control. B. Thirty-fifth day of smoking marihuana cigarettes (average—16.8 cigarettes per day). Note absence of increased muscle activity.

activity recorded from monopolar leads, additional investigations were made to determine the origin of the potentials. Bipolar needle electrodes were inserted into the temporalis muscles under aseptic conditions in two patients and the muscle activity thus directly recorded was found to increase after smoking marihuana cigarettes. This demonstrated that the potentials were actually of muscular, not cortical origin. In a series of eight experiments the effects on the electroencephalogram of smoking ordinary commercial tobacco cigarettes were studied with particular reference to muscle activity recorded by monopolar leads. In all, a slight, but transient, increase was seen immediately after smoking. The magnitude and duration of the change, however, was much less than after smoking marihuana cigarettes (fig. 9). To determine whether the muscle effects were due to a peripheral or central action of the drug, three cats were made spinal by transection of the cord at the foramen magnum under ether anesthesia, artificial respiration being maintained by an automatic apparatus and a tracheal cannula. After recovery from anesthesia, cortical potentials were recorded from screw leads in the calvarium and muscle poten-

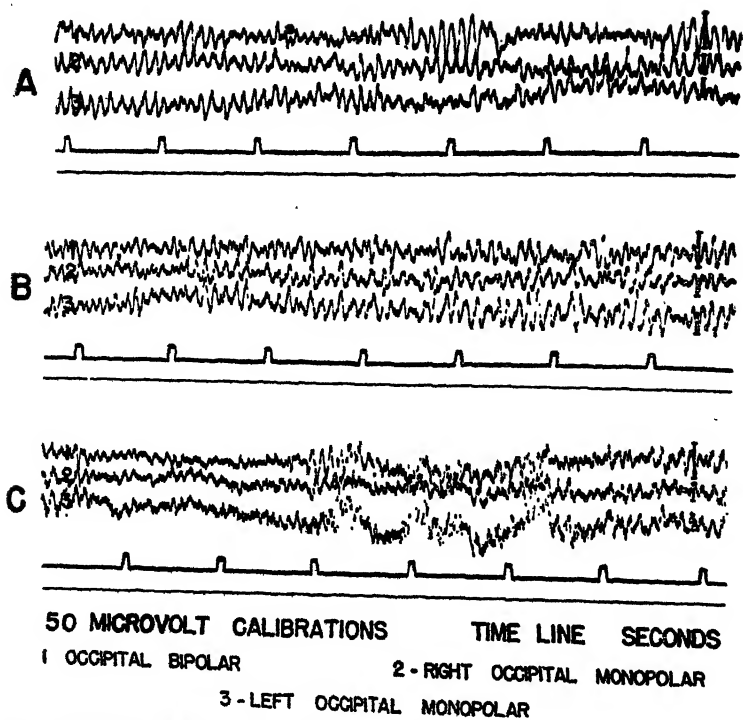


FIGURE 9.—Comparison of effects of smoking tobacco cigarettes and marijuana cigarettes on electroencephalogram. A. Control. B. Ten minutes after smoking 3 tobacco cigarettes. C. Ten minutes after smoking 2 marijuana cigarettes. Note absence of marked change in B, and marked increase in muscle potentials recorded from monopolar leads in C.

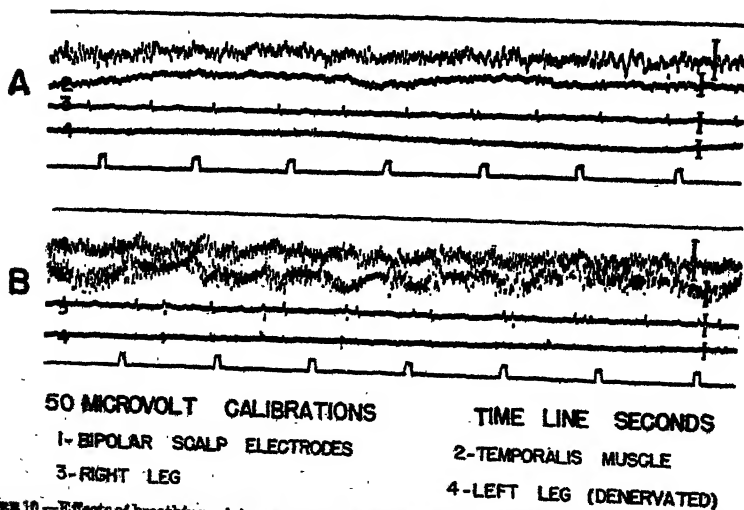


FIGURE 10.—Effects of breathing mixtures of marijuana smoke and air on electroencephalogram and muscle activity in acute spinal cat. A. Control. B. During breathing of marijuana smoke and air. Note disappearance of slower cortical rhythms in electroencephalogram, marked increase in muscle activity of intact temporalis muscle, and absence of increased muscle activity in hind-limb muscles.

tials from the intact temporalis muscle and both hind legs, one of which was denervated. After control records were taken, marihuana smoke was introduced into the air line at a constant rate. After several minutes the slower cortical rhythms (6 to 9 per second) disappeared and concurrently, spontaneous muscle activity increased in the temporalis muscle, but not in either of the hind legs (fig. 10). During inhalation of more concentrated marihuana smoke the cortical rhythms slowed markedly but since anoxia was probably a factor, the significance of these changes cannot be evaluated.

#### *Effects of Smoking Marihuana Cigarettes on Sensation*

Thresholds for touch, vibration sense, and two-point discrimination were studied in 6 subjects, olfactory thresholds in 3, and auditory acuity in 12, before and after smoking 2 or 3 marihuana cigarettes. Attempts to study the effects on pain thresholds with the Hardy-Wolff apparatus were unsuccessful because of the poor cooperation of the patients after smoking marihuana.

#### *Methods*

Touch thresholds were measured with a von Frey hair; vibration with the Roth "neurometer"; two-point discrimination with blunt pointed dividers; and smell with the Elsberg apparatus. The techniques employed have been described elsewhere (10). Time estimation was tested by requiring the patient, with eyes closed, to tell when he thought 20 seconds had elapsed after a prearranged signal. The time which actually elapsed was recorded by a stop watch. At no time was the patient informed of the accuracy of his estimate. Auditory acuity was measured by using earphones activated by current derived from a microvolter in a series with a Best frequency oscillator. Auditory thresholds, at frequencies of 1,000 and 2,000 cycles per second, were considered to have been obtained when the patient was just able to hear an intermittent tone, and were recorded in microvolts.

#### *Results*

No significant effects of marihuana were observed on thresholds for touch, vibration, two-point discrimination, or smell. Time estimation was impaired so that time appeared to pass more quickly (table 5). In 3 of the 12 subjects, a definite improvement in auditory acuity was observed, but no significant changes were noted in the remaining 9 cases, except in 1 patient who was very drowsy and whose auditory threshold was considerably increased.

#### *Discussion*

Of the six subjects participating in the continued pyrahexyl compound studies, two exhibited psychotic reactions which appeared during the withdrawal period. None of the six subjects participating



TABLE 5.—*Effect of smoking marihuana cigarettes (single studies) on time estimation*

Subject No.	Before marihuana		After marihuana	
	Time estimate (20 seconds)	Average deviation from mean	Time estimate (20 seconds)	Average deviation from mean
691	17.7	$\pm 2.43$	9.0	$\pm 0.67$
692	11.6	$\pm 1.06$	12.0	$\pm 0$
693	14.0	$\pm .66$	10.6	$\pm .47$
694	10.6	$\pm 1.8$	8.8	$\pm .4$
695	11.4	$\pm .93$	13.0	$\pm 0$
696	10.4	$\pm .04$	7.5	$\pm .5$

in the continued marihuana-smoking studies exhibited antisocial behavior or psychotic reactions. The principal early effects of marihuana or pyrahexyl compound were exhilaration and euphoria followed by general lassitude and indifference which resulted in carelessness in personal hygiene and lack of productive activity, which might be called social deterioration. In this sense, the use of marihuana corresponds in its social implications to opiate addiction and chronic alcoholism. It should be pointed out, however, that seldom, if ever, is marihuana smoked in such quantities or regularly for such periods of time as was done in the case of this study. Before the experiment started the patients estimated (and they certainly were not underestimating) that they would smoke from 6 to 10 cigarettes per day, stating that in civil life 3 good cigarettes would keep them "high" all day long. However, the fact that in isolated instances marihuana may produce bizarre effects of an antisocial nature is borne out by the following case:

The patient was a 23-year-old Puerto Rican. Psychiatric examination on admission to the institution revealed that he was distrustful and secretive, rather unstable emotionally, irresponsible and lazy, with poor judgment and insight. There was no evidence of psychosis and his intelligence was considered to be average. He was first used as a subject for the pyrahexyl studies, and following the withdrawal of pyrahexyl he was the one who developed a hypomaniac reaction. Subsequently he was again used as a subject in the studies of the effects of single doses of marihuana on auditory acuity. During the observation period just prior to the auditory acuity test his behavior was not unusual. After smoking three cigarettes auditory acuity was tested; he was asked to signal when he heard the first faint tone. He began to shout, "I hear, I hear," in a crescendo voice and became greatly agitated. He tore off the earphones, wept, and shouted accusations of persecution against the custodial supervisor which were definitely delusional. He protested loudly that he was innocent of all crimes and threatened anyone who would doubt it. During the entire course of this episode nothing provocative was said to him. The disturbance lasted for about an hour at the end of which time he vomited and became more calm. The test was discontinued and he was observed for several hours during which his emotional disturbance subsided and he was returned to the ward. Throughout the whole episode he was well oriented for person and place. It may be noted here that during the pyrahexyl studies his electroencephalogram showed bursts of very high amplitude

slow waves which were much larger, slower, and more periodic than that shown by any other subject (fig. 11).

The patients who were given pyrahexyl compound stated that this substance was quite similar to marihuana but they definitely preferred smoking marihuana cigarettes. This preference is probably because the effect of smoking cigarettes is immediate whereas the effect of pyrahexyl is delayed, and also because of pleasant memories associated with smoking marihuana.

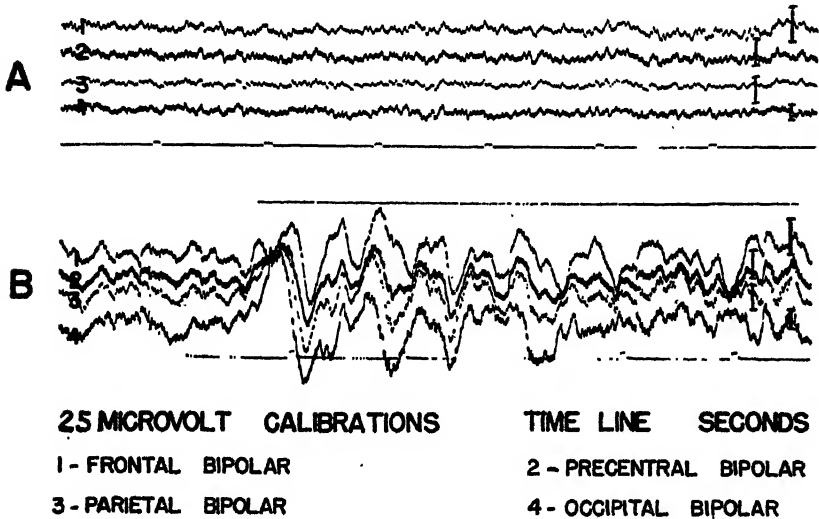


FIGURE 11.—Effects of continuous daily administration of pyrahexyl compound on electroencephalogram of patient who later developed acute transient psychotic episode after smoking marihuana cigarettes. A. Control. B. Twenty-seventh day of continuous medication with pyrahexyl compound (daily dose level—2,400 mg.). Note very large amplitude slow waves appearing in bursts.

The willingness of the patients to participate in these studies was probably the result of a desire to obtain marihuana or a marihuana-like compound and to demonstrate that marihuana is a harmless drug. The latter is an important factor in interpretation since if true they might have been trying to present as good an appearance as possible in order to create a favorable impression regarding marihuana. Another factor which is important in the interpretation is the fact that the study was conducted in a limited, protected environment, in an isolated part of the hospital where every effort was made to avoid unpleasant circumstances.

Marihuana smokers claim that smoking marihuana increases their productive activity, interest in work, and artistic ability. Under the conditions of the study no such effects were observed. The decrease in the pulse and respiratory rate in the pyrahexyl study, and the weight increase in both studies, perhaps can be attributed to the decreased activity and increased sleep during periods of medication as compared with the preliminary periods of observation or the 7-day

postmedication period. The greater effects observed during and especially following the pyrahexyl medication as compared with marihuana smoking probably can be attributed to the tremendous doses of pyrahexyl used. No attempt was made to compare accurately a dose of marihuana with a dose of pyrahexyl compound since the active principle of marihuana is not known and assays of the marihuana cigarettes were not made, but it is usually thought that 30 to 60 mg. of pyrahexyl compound are pharmacologically equivalent to one or two marihuana cigarettes.

The relatively slow and relatively slight increase in the number of cigarettes smoked suggests that rapid tolerance to marihuana does not develop. In both the pyrahexyl compound and the marihuana studies the initial loquaciousness and gaiety lasted only a few days and could be recaptured, if at all, only by increasing the dose. In this sense some tolerance was in evidence.

Only guarded statements can be made regarding the development of physical dependence from this study. Insofar as the pyrahexyl group is concerned, two of the six patients showed alterations in behavior during the week following withdrawal which might be interpreted as indicating dependence. Their symptoms were relieved by pyrahexyl or marihuana but it was not established that these substances constitute specific therapy. As regards the marihuana group, there is nothing that would indicate that they had developed physical dependence. The tension that the patients reported during the withdrawal period could be the result of their having spent much of their time smoking and now they were left without anything definite to do. One man voluntarily smoked only one cigarette on the last day of the smoking period, which he would not have done if physical dependence had developed.

The slowing of alpha and the appearance of delta activity which occurred during continued administration of large doses of pyrahexyl compound are similar to the changes produced by large doses of sedative drugs such as the barbiturates which in sufficiently large doses depress cortical electrical activity. The changes, therefore, cannot be considered specific for pyrahexyl compound. The effects were reversible in all cases, which suggests that no permanent change occurred in the central nervous system.

It is noteworthy that smoking of marihuana cigarettes and ingestion of single doses of pyrahexyl compound (30 to 120 mg.) produced similar results—mainly a lowering of alpha percentage without significant change in alpha frequency in a large proportion of the cases. Such changes are seen in normal subjects during mental efforts such as concentration, calculation, or attention. This suggests that smoking marihuana or taking pyrahexyl compound resulted in increased cerebral activity. Such an hypothesis is compatible with

the increase in recorded muscle potentials and the exhilarating effects which were observed to follow the use of these substances. After continued daily smoking of marihuana the effects on alpha percentage tended to disappear and this, too, appears to coincide with the absence of marked muscle activity on the electroencephalogram and diminution in the euphoric and exhilarating effects on the subjects.

The experiments on cats indicated that the increased muscle activity which was seen on the electroencephalogram after smoking marihuana was due to some effect of the drug on the central nervous system. An alternative explanation could be that the increased muscle potentials were due to reflex activity initiated by some effect of marihuana smoke on the respiratory system. This is unlikely because similar though less marked effects followed the ingestion of pyrahexyl compound, and because the increased muscle potentials were not marked during the continued daily smoking of marihuana.

A lack of effect of marihuana smoking on sensations in spite of evidence of marked effects on other types of cerebral functioning (e.g., time estimation) is not unique for this drug, since similar lack of effect on nonpainful sensations has been observed with morphine, barbiturates, alcohol, and acetylsalicylic acid (10). Alteration in ability to estimate time has been noted by other observers (11). Although the majority of our cases showed no changes in auditory acuity after smoking marihuana, lowering of the auditory threshold was striking in three and has been reported in the literature (11).

### Summary and Conclusions

Single- and continued-dose studies were made on subjects who had been accustomed to smoking marihuana and who were serving sentences for violation of the Marihuana Tax Act.

Six subjects were studied for periods of from 26 to 31 days on *ad libitum* doses of the synthetic substance, pyrahexyl compound. At the beginning of the studies there was euphoria, dryness of the mouth, injected sclerae, increased appetite, swollen eyelids, and spontaneous laughter. There was no gross ataxia. Several days after the beginning of the medication the euphoria gave way to a general lassitude and carelessness in personal appearance and tidiness. No adverse behavior was manifested by any of the subjects during the period of medication. During this period pulse and temperature decreased and weight increased, presumably due to lessened activity. Psychological measurements were made with the Rorschach, Wechsler-Bellevue, Tapping Speed, Minnesota Mechanical Ability, and Memory for Digits Tests. These showed that comprehension and analytical thinking were made more difficult and an adverse effect was noted in accuracy on those tests which require concentration and manual

dexterity. Personality changes in the direction of lessened inhibitions were also observed. Individuals became more spontaneous and more responsive to external stimuli under the influence of pyrahexyl compound. Single doses of pyrahexyl compound (30 and 120 mg.) had little effect on the electroencephalogram. During prolonged medication, however, the dominant frequencies were markedly slowed. When the drug was withdrawn one of the patients manifested a panic state and another exhibited a hypomanic reaction.

Six patients were allowed to smoke marihuana cigarettes *ad libitum* for a period of 39 days; the principal early effects were exhilaration and euphoria. However, after several days this was replaced by general lassitude and indifference which resulted in carelessness in personal hygiene and lack of productive activity. In a subsequent study one patient developed a transient psychotic episode with paranoid reactions after smoking three marihuana cigarettes. The group as a whole showed a tendency to increase in body weight. Plasma volume, blood volume, and thiocyanate fluid volume were not altered in the patients during or following the period of smoking marihuana cigarettes. Psychologic changes were studied with the aid of the Rorschach, Revised Stanford-Binet Scale (Form L), MacQuarrie Test for Mechanical Ability, Seashore Measure of Musical Talents, and the Muller-Lyer Illusion Tests. The results were very similar to those produced by pyrahexyl compound. Musical ability was not improved despite a subjective feeling that such improvement occurred. Smoking a few marihuana cigarettes caused no change in alpha frequency of the electroencephalogram, but there was a distinct trend towards lowering of the alpha percentage and increase in recorded muscle activity. These changes were not present during continued daily smoking of marihuana cigarettes. The electroencephalographic changes thus appeared to parallel the observed changes in overt behavior, namely, initial stimulation followed by subsequent diminution of activity. Touch, vibration, two-point discrimination, and smell thresholds were not affected by marihuana, but time estimation was impaired and, in 3 out of the 12 subjects, auditory acuity was improved.

In conclusion, it appears that the changes produced by these drugs are related to lessening of inhibition and removal of restraint. In the majority of the cases observed by us under our experimental conditions, no antisocial acts were manifested. However, it is recognized that in certain social situations, persons who are very poorly adjusted may exhibit antisocial behavior as a result of the effects of marihuana. Although tolerance apparently developed with prolonged use of both pyrahexyl compound and marihuana, the presence of physical dependence was not established.

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## COMPLEMENT-FIXATION TESTS FOR AMERICAN TRYPANOSOMIASIS IN TEXAS<sup>1</sup>

By DORLAND J. DAVIS, Surgeon, United States Public Health Service, and THEODORE SHAZO SULLIVAN, Bacteriologist, Texas State Department of Health

During 1942, a large number of samples of human serum were examined by means of the complement-fixation reaction in an effort to secure data concerning the possible existence of American trypanosomiasis (Chagas' disease) among the population of Texas. Although proved cases had not at that time been reported in the United States, the presence of reduviid bugs infected with *Trypanosoma cruzi* in Texas (1) suggested the possibility of human infection. The complement-fixation tests were done in the laboratories of the Texas State Department of Health; the antigen employed was prepared by freezing a concentrated culture of the Panama strain of *T. cruzi* (2). The specificity and sensitivity of this type of antigen has been confirmed recently by studies in Brazil (3) of acute and chronic cases.

A total of 1,909 samples of human serum from different parts of the State were tested. Of this number, 568 specimens were collected

<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health, and the Bureau of Laboratories, Texas State Department of Health.

from rural residents of Cameron, Hidalgo, Kinney, Uvalde, Webb, and Zavala Counties, mostly from school children of Mexican extraction, 85 percent of the group being under 20 years of age. This group was selected because a large proportion of them lived in shelters made of brush and cattails which afforded harborage for triatomid bugs, the carriers of *T. cruzi*. The only serum found to fix complement in significant dilution was from an 8-year-old boy living in Blewett, Uvalde County. Many specimens of *Triatoma gerstaeckeri* captured in this vicinity were found to be infected with the trypanosome. The boy was examined medically, and desert mice were inoculated with his freshly drawn blood, but no further evidence was obtained to indicate that he was infected.

One thousand and two Kline-negative samples sent to the laboratory by Selective Service Examination Boards, principally from counties in which *T. cruzi* had been demonstrated in insects, were all negative. In addition, complement-fixation tests were performed on 339 samples which had been sent to the laboratory by practicing physicians and found negative for the routine diagnostic tests requested. None of these serums fixed complement in the presence of *T. cruzi* antigen.

#### SUMMARY

On the basis of this evidence it appears that American trypanosomiasis, if present at all, is extremely rare in Texas.

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### VIABILITY OF DRIED *BACTERIUM TULARENSE*<sup>1</sup>

By RUSSELL P. MILLER, Senior Scientific Aide, United States Public Health Service

Storage of stock bacterial cultures dried in vacuum and sealed in glass ampules has become a routine practice. Report is here made of successful application of the method for 4 years to culture 38 of *Bacterium tularense*.

This culture was isolated from a human case of tularemia in Utah in 1920 and has been carried for many years on blood-dextrose-cystine agar at about 5° C., with frequent transfer to fresh medium, but with-

<sup>1</sup> From Biologics Control Laboratory, National Institute of Health.

out animal passage. The stock culture has received wide distribution to diagnostic laboratories throughout the United States and elsewhere because it has been long nonvirulent.

In June 1942 a culture was suspended in a mixture of beef infusion, cystine, and cooked rabbit's blood. Without delay, small portions of the mixture were transferred to small glass ampules, frozen in methyl cellosolve and dry ice, dried in vacuum, sealed in a flame, and stored in a covered wooden box on top of the laboratory desk at room temperature.

In April 1946 an ampule was opened and the contents planted on the surface of a slanted tube of blood-dextrose-cystine-agar and incubated at 37° C. During 7 days of observation no growth could be seen on the culture medium. The tube was then transferred to room temperature and after 48 hours innumerable small colonies covered the entire surface of the medium. A loopful of the colonies was transferred to fresh medium resulting in a luxuriant growth which was further propagated. The growth was removed, suspended in physiological saline solution, and was agglutinated out to the full titer (1:2,560) of a known antitularensis serum.

## DEATHS DURING WEEK ENDED JUNE 22, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 22, 1946	Correspond- ing week, 1945
<b>Data for 92 large cities of the United States:</b>		
Total deaths.....	7,940	8,529
Average for 8 prior years.....	8,232	
Total deaths, first 25 weeks of year.....	220,351	216,106
Deaths under 1 year of age.....	603	578
Average for 8 prior years.....	585	
Deaths under 1 year of age, first 25 weeks of year.....	14,485	14,467
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67,219,482	67,379,078
Number of death claims.....	11,322	12,544
Death claims per 1,000 policies in force, annual rate.....	8.8	9.7
Death claims per 1,000 policies, first 25 weeks of year, annual rate.....	10.3	10.9



# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED JUNE 29, 1946

#### Summary

Increased incidence of poliomyelitis was reported for the week in all of the 9 geographic divisions except the New England, South Atlantic, and East South Central areas. The increases ranged from 4 in the Pacific area to 25 in the West South Central. A total of 273 cases was reported, as compared with 204 last week, 220 for the week in 1944 (the highest incidence for a corresponding week in the past 5 years) and a 5-year (1941-45) median of 156. Of the 13 States reporting more than 6 cases, only Florida reported a decrease. These States are as follows (last week's figures in parentheses): New York 14 (7), Ohio 7 (2), Illinois 18 (12), Minnesota 10 (1), Missouri 8 (1), Georgia 8 (4), Florida 21 (34), Arkansas 8 (1), Louisiana 13 (8), Oklahoma 10 (5), Texas 52 (44), Colorado 25 (11), California 22 (18). The cumulative total, 1,856, as compared with 1,271 for the corresponding period last year, is more than reported for any previous corresponding period since 1934. The total since March 16 is 1,390, as compared with 874 for the corresponding period last year.

Six cases of smallpox were reported (the same number as for last week), 1 each in New Jersey (nonresident), Indiana, Illinois, Kentucky, Arkansas, and Oklahoma. The total for the year to date is 254, as compared with 245 for the same period last year and a 5-year median of 568.

Of 218 cases of diphtheria, as compared with 222 last week, South Carolina reported 44, Texas 24, and California 15. The total to date, 8,421, as compared with 6,739 for the corresponding period last year and a 5-year median of 6,314, is more than reported for any corresponding period since 1939.

Other diseases with cumulative figures above those for the same period last year are as follows (last year's corresponding figures in parentheses): Amebic dysentery 1,443 (841), infectious encephalitis 236 (180), influenza 188,206 (66,474), measles 612,397 (91,193), Rocky Mountain spotted fever 170 (153), tularemia 471 (405).

Deaths recorded for the week in 93 large cities of the United States totaled 8,557, as compared with 8,628 last week, 8,747 and 8,476, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,884. The cumulative figure is 248,525, as compared with 243,311 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended June 29, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945	
NEW ENGLAND												
Maine	1	1	0				101	2	95	0	0	1
New Hampshire	0	0	0				22	15	9	0	0	1
Vermont	1	0	0				139	22	55	0	0	0
Massachusetts	3	6	1				1,351	315	457	2	5	4
Rhode Island	0	0	0		25		84	6	20	0	1	0
Connecticut	0	2	0		1		268	54	141	2	1	2
MIDDLE ATLANTIC												
New York	10	13	13	14	11	13	1,563	152	611	6	17	17
New Jersey	4	2	2	4	1	3	811	48	344	1	3	3
Pennsylvania	7	3	7				785	407	390	10	8	6
EAST NORTH CENTRAL												
Ohio	10	9	7		1	2	613	35	90	6	6	4
Indiana	4	5	4		6	6	95	16	37	0	3	1
Illinois	9	0	11		3	3	254	373	373	5	7	6
Michigan	4	11	6		4		279	181	259	2	11	11
Wisconsin	0	1	1	10	1	7	1,066	93	789	1	4	1
WEST NORTH CENTRAL												
Minnesota	0	2	2				22	9	66	3	1	1
Iowa	5	4	1				120	49	51	3	4	0
Missouri	8	2	1		2	1	46	36	36	1	3	3
North Dakota	0	7	0	3	2		13	1	9	0	0	0
South Dakota	0	2	1				7	15	6	0	1	0
Nebraska	0	1	1		1		58	7	20	1	0	1
Kansas	3	4	3	1	1		34	29	63	2	1	1
SOUTH ATLANTIC												
Delaware	0	0	0				7	2	4	0	0	0
Maryland	6	5	3				326	9	65	0	6	5
District of Columbia	0	0	0				64	1	30	0	0	0
Virginia	6	2	4	70	74	56	336	21	61	7	4	4
West Virginia	5	2	2	2	9	2	282	4	31	0	0	1
North Carolina	10	7	4		1	115	46	122	0	5	3	3
South Carolina	44	9	6	104	53	64	163	19	34	0	3	2
Georgia	2	1	3	1	62	3	64		25	0	1	1
Florida	3	1	2	1		1	8	10	22	1	1	2
EAST SOUTH CENTRAL												
Kentucky	3	3	1			1	17	39	31	1	0	1
Tennessee	4	1	2	7	3	4	54	20	35	3	4	1
Alabama	6	3	3	17	6	6	62	1	16	6	10	2
Mississippi	7	8	3							0	2	0
WEST SOUTH CENTRAL												
Arkansas	0	2	2	2	2	2	49	27	28	0	5	0
Louisiana	1	5	4			1	53	46	15	0	2	1
Oklahoma	0	3	1	2	9	9	67	14	39	1	0	0
Texas	24	28	18	214	338	264	441	208	196	4	9	6
MOUNTAIN												
Montana	0	0	0				60	4	15	0	1	1
Idaho	0	1	0				14	3	7	1	0	0
Wyoming	0	0	0				2	4	14	1	0	0
Colorado	6	5	5		12	11	130	8	61	0	1	1
New Mexico	1	6	3	2	1		33	6	11	0	0	0
Arizona	2	0	0	9	38	38	56		18	0	1	0
Utah	1	1	0	3			74	205	60	0	1	1
Nevada	0	0	0					1	2	0	0	0
PACIFIC												
Washington	0	10	4		2	1	55	185	137	3	2	2
Oregon	3	10	2		1	3	128	33	46	1	0	0
California	15	18	16	5	13	15	654	667	667	7	9	9
Total	218	206	159	461	672	672	11,038	3,448	6,333	81	144	144
26 weeks	8,421	6,739	6,314	188,206	66,474	78,126	612,397	91,193	509,829	3,064	5,419	5,419

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended June 2, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>1</sup>		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945	
NEW ENGLAND												
Maine.....	0	0	0	10	28	7	0	0	0	0	1	1
New Hampshire.....	0	0	0	3	2	2	0	0	0	1	0	0
Vermont.....	0	0	0	4	6	3	0	0	0	0	0	0
Massachusetts.....	0	2	0	91	104	147	0	0	0	24	4	4
Rhode Island.....	0	0	0	1	2	5	0	0	0	1	0	1
Connecticut.....	1	1	0	14	20	22	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York.....	14	16	4	204	309	176	0	0	0	6	3	3
New Jersey.....	3	5	1	70	32	37	4	0	0	0	0	1
Pennsylvania.....	2	1	1	96	161	113	0	0	0	3	3	8
EAST NORTH CENTRAL												
Ohio.....	7	5	1	119	126	86	0	0	0	6	4	4
Indiana.....	2	3	0	21	29	20	1	0	0	1	3	3
Illinois.....	18	2	2	77	114	62	1	0	1	5	2	2
Michigan.....	3	0	0	74	104	85	0	0	0	3	2	2
Wisconsin.....	1	0	0	48	82	68	0	1	0	1	0	0
WEST NORTH CENTRAL												
Minnesota.....	10	1	1	16	42	29	0	0	0	0	0	0
Iowa.....	3	1	0	15	21	15	0	0	0	0	0	0
Missouri.....	8	2	1	8	15	12	0	0	0	2	1	2
North Dakota.....	0	0	0	2	9	9	0	2	0	5	0	0
South Dakota.....	3	0	0	2	1	4	0	0	0	0	1	0
Nebraska.....	1	0	0	3	10	8	0	0	0	13	0	0
Kansas.....	5	1	1	22	41	17	0	0	0	3	0	3
SOUTH ATLANTIC												
Delaware.....	0	1	0	1	1	1	0	0	0	1	0	0
Maryland.....	0	1	0	21	31	24	0	0	0	0	0	1
District of Columbia.....	0	3	0	4	13	7	0	0	0	0	2	0
Virginia.....	0	5	2	39	45	13	0	0	0	6	15	4
West Virginia.....	1	2	0	11	26	13	0	0	0	2	3	2
North Carolina.....	3	5	1	9	32	12	0	0	0	2	4	4
South Carolina.....	1	8	2	3	2	2	0	0	0	5	9	5
Georgia.....	8	1	1	3	1	7	0	0	0	5	6	9
Florida.....	21	1	1	3	4	4	0	0	0	5	18	4
EAST SOUTH CENTRAL												
Kentucky.....	4	3	3	6	19	19	1	0	0	0	2	8
Tennessee.....	6	6	1	3	13	13	0	0	0	5	10	10
Alabama.....	6	7	1	4	5	5	0	0	0	5	9	3
Mississippi.....	3	0	2	4	2	3	0	0	0	3	4	4
WEST SOUTH CENTRAL												
Arkansas.....	8	1	3	1	7	2	1	0	0	3	3	7
Louisiana.....	13	2	2	3	5	5	0	0	0	3	2	6
Oklahoma.....	10	3	2	5	18	4	1	1	0	0	1	1
Texas.....	52	54	5	23	48	28	0	0	0	12	15	17
MOUNTAIN												
Montana.....	0	0	0	3	2	6	0	0	0	0	1	1
Idaho.....	1	0	0	2	0	1	0	0	0	4	1	1
Wyoming.....	0	0	0	0	5	5	0	1	0	0	1	0
Colorado.....	25	0	1	39	17	17	0	0	0	0	1	1
New Mexico.....	1	0	0	3	5	2	0	0	0	0	1	2
Arizona.....	1	0	0	8	10	8	0	0	0	0	2	0
Utah.....	3	0	0	8	10	10	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	3	6	0	18	21	21	0	0	0	1	0	1
Oregon.....	6	1	0	20	17	8	0	0	0	0	0	1
California.....	22	12	12	79	188	110	0	0	0	2	0	4
Total.....	272	156	156	1,223	1,805	1,415	6	5	8	138	186	141
26 weeks.....	1,856	1,271	1,002	82,114	127,915	92,168	254	245	568	1,586	1,742	2,115

<sup>2</sup> Period ended earlier than Saturday.

<sup>3</sup> Including paratyphoid fever reported separately, as follows: Massachusetts, 23; Rhode Island, 1; Michigan, 1; South Carolina, 1; Georgia, 1; Florida, 3; Texas, 2.

<sup>4</sup> This case reported in Trenton for week ended June 22 (see p. 1080).

*Telegraphic morbidity reports from State health officers for the week ended June 29, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.*

Division and State	Whooping cough			Week ended June 29, 1946							
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	June 29, 1946	June 30, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	10	100	19								
New Hampshire.....	11										
Vermont.....	21	11	11								1
Massachusetts.....	146	107	107		2						
Rhode Island.....	25	28	28								
Connecticut.....	39	53	47		1						2
MIDDLE ATLANTIC											
New York.....	111	258	270	4	4		1	1		1	2
New Jersey.....	130	174	174	1							
Pennsylvania.....	80	214	237								3
EAST NORTH CENTRAL											
Ohio.....	72	127	227				1		1		3
Indiana.....	23	33	33					1			8
Illinois.....	92	81	117	5			1		1		15
Michigan <sup>1</sup> .....	126	44	122	1							2
Wisconsin.....	135	48	129	1					2		8
WEST NORTH CENTRAL											
Minnesota.....	5	7	34								3
Iowa.....	35	1	27	1							59
Missouri.....	15	23	29								
North Dakota.....	2		5			1					
South Dakota.....		4	4								1
Nebraska.....	6	2	7								
Kansas.....	33	17	54	1			1				2
SOUTH ATLANTIC											
Delaware.....	1		1					3			
Maryland <sup>1</sup> .....	21	70	79			1	1	1			1
District of Columbia.....	13	22	22								
Virginia.....	80	67	67			171		3			4
West Virginia.....	53	24	24								1
North Carolina.....	159	287	275					2	1		
South Carolina.....	74	96	96	2	44			1		2	3
Georgia.....	47	19	18		9			1	1	16	1
Florida.....	36	3	11	6				1		6	
EAST SOUTH CENTRAL											
Kentucky.....	17	44	69								
Tennessee.....	28	30	58		1	1		1	2	1	1
Alabama.....	32	21	30					1	8	6	5
Mississippi <sup>1</sup> .....									1	3	4
WEST SOUTH CENTRAL											
Arkansas.....	14	10	19	2					14		
Louisiana.....		3	3							5	4
Oklahoma.....	8	22	16					1			1
Texas.....	249	264	264	397	46	64				27	10
MOUNTAIN											
Montana.....	3	4	13								
Idaho.....	3	9	4								
Wyoming.....	32		4				1				
Colorado.....		28	28	1			1				
New Mexico.....	17	8	8			1					
Arizona.....	7	11	12			32					3
Utah <sup>1</sup> .....	13	31	63					1	2		
Nevada.....											
PACIFIC											
Washington.....	23	11	50								1
Oregon.....	55	17	20	1		1					
California.....	50	240	203	3	5		3			3	4
Total.....	2,152	2,673	3,237	426	112	272	11	16	23	70	155
Same week, 1945.....	2,673			48	703	216	6	26	15	127	116
Average, 1943-45.....	2,963			57	717	283	10	25	16	482	
26 weeks: 1946.....	49,215			1,443	8,748	3,269	236	170	471	1,325	2,396
1945.....	65,092			1,841	11,684	3,307	180	153	405	1,598	2,435
Average, 1943-45.....	72,870		498,514	852	8,961	2,644	251	184	394	1,286	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

*Leprosy:* Florida 1 case; California 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended June 22, 1946

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococ- cus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	41	0	2	0	1	0	0	4
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	2	0	1	0	0	-----
Vermont:												
Barrens.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Massachusetts:												
Boston.....	5	0	-----	0	171	2	3	0	30	0	0	14
Fall River.....	0	0	-----	0	34	0	1	0	6	0	0	-----
Springfield.....	0	0	-----	0	81	0	0	0	1	0	0	6
Worcester.....	1	0	-----	0	204	0	5	0	2	0	4	54
Rhode Island:												
Providence.....	0	2	1	0	86	0	1	0	2	0	0	12
Connecticut:												
Bridgeport.....	0	0	-----	0	2	0	1	0	1	0	0	-----
Hartford.....	0	0	-----	0	1	0	1	0	3	0	0	2
New Haven.....	0	1	-----	0	50	0	0	0	0	0	0	-----
MIDDLE ATLANTIC												
New York:												
Buffalo.....	1	0	-----	1	10	0	7	0	6	0	0	5
New York.....	9	1	2	1	432	7	27	3	96	0	4	37
Rochester.....	0	0	-----	0	65	0	0	0	14	0	3	-----
Syracuse.....	0	0	-----	1	4	0	0	1	9	0	0	-----
New Jersey:												
Camden.....	0	0	-----	0	6	0	1	0	3	0	0	4
Newark.....	0	0	-----	0	39	0	3	0	6	0	0	20
Trenton.....	0	0	-----	0	50	1	1	0	2	*1	0	5
Pennsylvania:												
Philadelphia.....	8	0	1	0	89	1	16	0	34	0	2	10
Pittsburgh.....	1	0	-----	0	30	2	7	0	14	0	0	5
Reading.....	1	0	-----	0	-----	0	0	0	1	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0	-----	1	12	1	5	2	7	0	0	9
Cleveland.....	0	0	-----	0	227	4	4	0	19	0	0	14
Columbus.....	1	0	-----	0	8	0	0	0	4	0	0	2
Indiana:												
Fort Wayne.....	0	0	-----	0	2	0	1	0	1	0	0	1
Indianapolis.....	0	0	-----	1	19	2	2	0	3	0	0	4
Terre Haute.....	0	0	-----	0	9	0	1	0	1	0	0	-----
Illinois:												
Chicago.....	0	0	1	0	67	2	18	0	49	0	1	34
Springfield.....	0	0	-----	0	-----	0	1	0	1	0	1	-----
Michigan:												
Detroit.....	3	0	-----	0	42	0	3	1	34	0	1	27
Flint.....	0	0	-----	0	-----	0	2	0	2	0	0	3
Grand Rapids.....	0	0	-----	0	29	1	0	0	3	0	0	6
Wisconsin:												
Kenosha.....	0	0	-----	0	58	0	0	0	0	0	0	-----
Milwaukee.....	0	0	1	1	147	1	3	0	11	0	1	45
Racine.....	0	0	-----	0	175	0	0	0	4	0	0	-----
Superior.....	0	0	-----	0	5	0	0	0	2	0	0	16
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	-----	0	4	0	0	0	1	0	0	1
Minneapolis.....	3	0	-----	0	11	0	6	1	15	0	0	-----
St. Paul.....	1	0	-----	0	10	2	1	0	3	0	1	8
Missouri:												
Kansas City.....	2	0	-----	0	-----	0	10	0	1	0	1	3
St. Joseph.....	0	0	-----	0	2	0	0	0	1	0	0	-----
St. Louis.....	0	1	1	0	61	0	10	3	6	0	0	2

\*Nonresident.

## City reports for week ended June 22, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, me- ningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL— continued												
Nebraska:												
Omaha	4	0	—	0	5	0	1	1	2	0	0	—
Kansas:												
Topeka	0	0	—	0	1	0	1	0	3	0	0	13
Wichita	0	0	1	0	8	0	1	2	3	0	0	4
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	—	0	8	0	1	0	0	0	0	—
Maryland:												
Baltimore	7	0	1	1	390	2	5	0	5	0	0	16
Cumberland	0	0	—	0	1	0	0	0	4	0	0	—
Frederick	0	0	—	0	1	0	1	0	0	0	0	—
District of Columbia:												
Washington	0	0	—	0	91	2	4	0	7	0	0	9
Virginia:												
Lynchburg	0	0	—	0	5	0	0	0	1	0	0	—
Richmond	0	0	—	0	43	0	3	0	5	0	0	8
Roanoke	0	0	—	0	2	0	0	0	0	0	0	—
West Virginia:												
Charleston	0	0	—	0	—	0	0	0	0	0	0	—
Wheeling	1	0	—	0	—	0	1	0	0	0	0	20
North Carolina:												
Raleigh	0	0	—	0	—	0	2	0	2	0	0	2
Winston-Salem	0	0	—	0	18	0	1	0	0	0	0	14
South Carolina:												
Charleston	0	0	—	0	6	0	1	*1	0	0	0	—
Georgia:												
Atlanta	0	0	1	1	18	0	1	0	1	0	0	—
Brunswick	0	0	—	0	—	0	0	0	0	0	0	—
Savannah	0	0	—	0	7	0	1	0	0	0	0	—
Florida:												
Tampa	1	0	—	0	6	0	2	5	1	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	—	0	15	0	10	0	1	0	0	11
Nashville	0	0	—	1	—	0	2	0	0	0	0	—
Alabama:												
Birmingham	0	0	—	0	2	0	2	0	2	0	1	—
Mobile	0	0	1	0	6	0	0	1	0	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	—	0	2	0	1	0	0	0	0	—
Louisiana:												
New Orleans	0	0	—	0	15	0	5	*8	0	0	1	2
Shreveport	0	0	—	0	—	0	0	0	0	0	0	—
Texas:												
Dallas	1	0	—	0	5	0	3	2	0	0	0	—
Galveston	0	0	—	0	—	0	2	0	0	0	0	2
Houston	0	0	—	0	1	0	4	3	1	0	0	—
San Antonio	2	0	—	0	8	0	1	9	0	0	0	2
MOUNTAIN												
Montana:												
Billings	0	0	—	0	8	0	1	0	0	0	0	—
Great Falls	0	0	—	0	15	0	0	0	0	0	0	—
Helena	0	0	—	0	3	0	0	0	0	0	0	—
Missoula	0	0	—	0	2	0	0	0	0	0	0	—
Colorado:												
Denver	1	0	2	0	41	0	1	4	9	0	0	11
Pueblo	0	0	—	0	25	0	0	0	0	0	0	—
Utah:												
Salt Lake City	0	0	—	0	39	0	1	0	4	0	0	1

\*Nonresident cases included: Charleston, S. C., 1; New Orleans, 4.

## City reports for week ended June 22, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	29	0	2	1	1	0	1	8
Spokane.....	0	0	-----	0	3	0	0	0	0	0	0	3
Tacoma.....	0	0	-----	0	-----	0	0	0	0	0	0	4
California:												
Sacramento.....	1	0	-----	0	13	0	0	0	1	0	0	-----
San Francisco.....	2	0	-----	1	25	2	7	0	13	0	0	2
Total.....	58	5	13	10	3,148	32	213	48	467	1	22	490
Corresponding week, 1945.....	56	-----	29	9	1,817	-----	294	-----	704	1	14	606
Average, 1941-45.....	50	-----	24	10	2,831	-----	1,266	-----	630	1	17	920

1 3-year average, 1943-45.

2 5-year median, 1941-45.

Dysentery, amebic.—Cases: Buffalo, 11; New York, 2; Chicago, 1; Detroit, 1.

Dysentery, bacillary.—Cases: New York, 3; Detroit, 2; Baltimore, 1; Memphis, 1; San Antonio, 4; San Francisco, 1.

Dysentery, unspecified.—Cases: New Haven, 1; San Antonio, 11.

Rocky Mountain spotted fever.—Cases: Frederick, 1.

Tularemia.—Cases: St. Louis, 1; Winston-Salem, 1.

Typhus fever, endemic.—Cases: Tampa, 6; Mobile, 3; New Orleans, 4.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 32,479,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	15.7	7.8	2.6	0.0	1,751	5.2	41.8	0.0	125	0.0	10.5	240
Middle Atlantic.....	9.3	0.5	1.4	1.4	338	5.1	28.7	1.9	88	0.5	4.2	41
East North Central.....	3.1	0.0	1.2	1.3	493	6.3	24.6	1.8	87	0.0	2.5	99
West North Central.....	20.1	2.0	4.0	0.0	208	4.0	60.3	14.1	70	0.0	4.0	62
South Atlantic.....	14.9	0.0	3.3	3.3	986	6.6	35.2	10.0	43	0.0	0.0	118
East South Central.....	5.9	0.0	5.9	5.9	136	0.0	82.6	5.9	18	0.0	5.9	65
West South Central.....	8.6	0.0	0.0	0.0	89	0.0	45.9	63.1	3	0.0	2.9	17
Mountain.....	8.3	0.0	16.5	0.0	1,099	0.0	24.8	33.0	107	0.0	0.0	99
Pacific.....	9.8	0.0	0.0	3.3	229	6.5	29.4	3.3	49	0.0	3.3	55
Total.....	9.3	0.8	2.1	1.6	507	5.2	34.3	7.7	75	0.2	3.5	79

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended June 1, 1946.*—During the week ended June 1, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		44		132	618	35	37	25	107	998
Diphtheria.....	3	4		23	7	3	1	2	2	45
Dysentery, unspecified.....					2					2
German measles.....				44	38			11	9	103
Influenza.....		2					5		4	11
Measles.....		31	3	494	1,240	68	29	318	11	2,194
Meningitis, meningococcus.....			1		3					4
Mumps.....			1	39	350	84	34	37	183	728
Polio-myelitis.....	4	1			1					6
Scarlet fever.....		7	2	101	74	12	2	13	5	216
Tuberculosis (all forms).....		12	40	67	62	20	18		47	266
Typhoid and paratyphoid fever.....			1	19	1				7	28
Undulant fever.....				1	4				1	6
Venereal diseases:										
Gonorrhea.....	1	17	5	118	146	42	49	56		434
Syphilis.....		10	3	90	98	22	13	6		242
Whooping cough.....		3		22	84	1		6	1	117

### CUBA

*Polio-myelitis.*—During the month of May 1946, 65 cases of polio-myelitis with 1 death were reported in Cuba, distributed by provinces as follows: Habana, 30 cases, 1 death (city of Habana, 14 cases, 1 death); Matanzas, 20 cases; Santa Clara, 10 cases; Pinar del Rio, 4 cases; Camaguey, 1 case.

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Smallpox

*Mexico.*—For the month of May 1946, 78 cases of smallpox were reported in Mexico. States reporting the highest incidence are: Jalisco, 42 cases; Nayarit, 20 cases.



## Typhus Fever

*Belgian Congo*.—For the week ended June 8, 1946, 103 cases of typhus fever were reported in Belgian Congo.

*Ecuador*.—For the month of May 1946, 65 cases of typhus fever, with 3 deaths, were reported in Ecuador. Provinces reporting the highest incidence are: Azuay, 19 cases, 1 death; Tungurahua, 13 cases; Canar, 10 cases.

*Mexico*.—For the month of May 1946, 124 cases of typhus fever were reported in Mexico. States reporting the highest incidence are: Federal District, 34 cases; Mexico State, 32 cases.

*Morocco (French)*.—For the period June 1-10, 1946, 199 cases of typhus fever were reported in French Morocco, including cases reported by regions as follows: Agadir and frontier districts, 23; Casablanca, 29; Fez, 52; Marrakech, 30; Meknes, 36; Oujda, 1; Rabat, 28.

*Peru*.—For the month of April 1946, 102 cases of typhus fever were reported in Peru. Departments reporting the highest incidence are: Cuzco, 31; Puno, 21; Cajamarca, 15; Junin, 9; Huancavelica, 8.

## Yellow Fever

*Colombia—Magdalena Department—Municipality of Plato*.—On March 31, 1946, 1 death from yellow fever was reported in the Municipality of Plato, Magdalena Department, Colombia.

*Nigeria—Oyo Province—Ogbomosho*.—On May 17, 1946, 25 cases of yellow fever, including 24 cases of suspected yellow fever, with 1 death, were reported in Ogbomosho, Oyo Province, Nigeria.

*Sierra Leone—Pujehan*.—One case of suspected yellow fever with the date of onset about June 11, 1946, resulting in death on June 20, 1946, was reported in Pujehan, Sierra Leone, about three and one-half miles from Freetown. All precautions have been taken.

FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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# Public Health Reports

**VOLUME 61**

**JULY 26, 1946**

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# Public Health Reports

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## SICKNESS ABSENTEEISM AMONG INDUSTRIAL WORKERS, THIRD AND FOURTH QUARTERS OF 1945<sup>1</sup>

By W. M. GAFAFER, *Principal Statistician, United States Public Health Service*

An analysis is herewith presented of the morbidity experience of approximately 200,000 male workers during the third and fourth quarters of 1945. The basic data, covering disabilities of more than 1 week, are derived from periodic reports from industrial sick benefit associations, company relief departments, and group insurance plans.

### THIRD QUARTER, 1945

Table 1 gives average annual frequency rates for the third quarters of 1945 and 1944 according to specific cause of disability. An examination of the rates for the two third-quarter periods reveals (1) a slight increase in the 1945 rate for all causes, (2) relatively stable rates in the 2 years for the groups of respiratory and digestive diseases, and (3) an increase of .8 percent in the 1945 rate for the group of non-respiratory-nondigestive diseases. Among the specific nonrespiratory-nondigestive causes, only the 1945 rate for diseases of organs of movement except diseases of joints failed to equal or exceed the corresponding rate for 1944.

### FOURTH QUARTER, 1945

Average annual frequency rates by cause are shown in table 2 for the fourth quarters of 1945 and 1944. Notable is the 1945 frequency of influenza and grippe, the rate (35.0 absences per 1,000 males) assuming epidemic proportions and contributing half of the total

<sup>1</sup> From Industrial Hygiene Division, Bureau of State Services. The report for second quarter appeared in PUBLIC HEALTH REPORTS, 60: 1179-1181 (Oct. 5, 1945).

respiratory rate recorded for the quarter. Attention is directed also to the increases of 9 and 7 percent, respectively, in the 1945 rates for all causes and for the group of nonrespiratory-nondigestive diseases. The latter increase, while not large, is almost the same as that observed above in the corresponding third-quarter rates.

TABLE 1.—Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause, experience of MALE employees in various industries, third quarter of 1945 compared with third quarter of 1944, and first 9 months of 1945 compared with first 9 months of years 1940-44, inclusive<sup>1</sup>

Cause <sup>2</sup>	Annual number of absences per 1,000 males				
	Third quarter		First 9 months		
	1945	1944	1945	1944	1940-44
Sickness and nonindustrial injuries.....	120.4	117.4	143.9	140.1	117.7
Nonindustrial injuries (169-195).....	12.3	13.5	13.6	11.9	11.9
Sickness.....	108.1	103.9	130.3	128.2	105.8
Respiratory diseases.....	29.8	29.9	50.8	57.4	49.1
Tuberculosis of respiratory system (13).....	.8	.7	.7	.8	.8
Influenza, gripe (33).....	8.5	8.2	17.3	25.7	20.9
Bronchitis, acute and chronic (106).....	5.4	6.0	9.2	8.8	7.5
Pneumonia, all forms (107-109).....	2.9	2.5	5.4	6.6	6.0
Diseases of pharynx and tonsils (115b, 115c).....	4.3	4.9	6.2	6.1	6.0
Other respiratory diseases (104, 105, 110-114).....	7.9	7.6	12.0	9.4	7.9
Digestive diseases.....	21.3	20.7	21.2	19.3	18.7
Diseases of stomach except cancer (117, 118).....	8.5	7.3	7.9	6.4	6.0
Diarrhea and enteritis (120).....	2.8	2.6	2.7	2.8	2.0
Appendicitis (121).....	3.3	4.8	4.0	4.7	4.9
Hernia (122a).....	2.8	2.1	2.8	2.0	1.8
Other digestive diseases (115a, 115d, 116, 122b-123).....	3.9	2.9	3.8	3.4	3.0
Nonrespiratory-nondigestive diseases.....	51.2	47.6	52.4	45.8	36.5
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44) <sup>3</sup> .....	2.5	2.1	3.1	2.5	2.5
Rheumatism, acute and chronic (58, 59).....	6.4	6.0	7.1	6.1	4.6
Neurasthenia and the like (part of 84d).....	3.0	2.6	2.8	2.3	1.4
Neuralgia, neuritis, sciatica (87b).....	4.1	2.9	4.0	3.1	2.5
Other diseases of nervous system (80-85, 87, except part of 84d, and 87b).....	2.4	2.4	2.3	2.0	1.4
Diseases of heart and arteries, and nephritis (90-99, 102, 130-132).....	8.0	7.3	8.6	7.4	5.2
Other diseases of genitourinary system (133-138).....	4.2	3.9	3.7	3.6	2.8
Diseases of skin (151-153).....	4.0	3.7	3.8	3.5	3.1
Diseases of organs of movement except diseases of joints (156b).....	3.4	4.0	3.9	3.8	3.3
All other diseases (45-57, 60-79, 88, 89, 100, 101, 103, 154, 155, 166a, 157, 162).....	13.2	12.7	13.1	11.5	9.7
Ill-defined and unknown causes (200).....	5.8	5.7	5.9	5.7	3.5
Average number of males.....	208,887	239,104	218,268	247,409	1,203,290

<sup>1</sup> Industrial injuries and venereal diseases are not included.

<sup>2</sup> Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.

<sup>3</sup> Exclusive of influenza and gripe, respiratory tuberculosis, and venereal diseases.

### THIRD AND FOURTH QUARTERS, 1936-45

*Broad cause groups.*—Figure 1 presents graphically for the third and fourth quarters of the 10 years 1936-45 the contribution of each of the four broad cause groups to the total frequency of sickness and nonindustrial injuries.

TABLE 2.—Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause, experience of MALE employees in various industries, fourth quarter of 1945 compared with fourth quarter of 1944, and year 1945 compared with years 1940-44, inclusive<sup>1</sup>

Cause <sup>2</sup>	Annual number of absences per 1,000 males				
	Fourth quarter		Year		
	1945	1944	1945	1944	1940-44
Sickness and nonindustrial injuries.....	157.8	144.3	147.1	140.7	117.8
Nonindustrial injuries (169-195).....	12.8	11.7	13.4	11.9	11.9
Sickness.....	145.0	132.6	133.7	128.8	105.9
Respiratory diseases.....	70.0	59.9	55.2	57.9	49.8
Tuberculosis of respiratory system (18).....	.5	.5	.7	.7	.7
Influenza, grippé (33).....	35.0	20.5	21.4	24.5	21.4
Bronchitis, acute and chronic (106).....	10.7	13.9	9.6	10.0	7.9
Pneumonia, all forms (107-109).....	5.2	5.8	5.3	6.5	5.8
Diseases of pharynx and tonsils (115b, 115c).....	4.2	5.5	5.7	5.9	5.7
Other respiratory diseases (104, 105, 110-114).....	14.4	13.7	12.5	10.3	8.3
Digestive diseases.....	18.0	19.4	20.4	19.2	16.5
Diseases of stomach except cancer (117, 118).....	6.2	6.8	7.5	6.4	5.1
Diarrhea and enteritis (120).....	2.6	2.4	2.7	2.7	1.9
Appendicitis (121).....	2.8	4.3	3.7	4.7	4.8
Hernia (122a).....	2.5	2.2	2.7	2.0	1.8
Other digestive diseases (115a, 115d, 116, 122b-129).....	3.9	3.7	3.8	3.4	2.9
Nonrespiratory-nondigestive diseases.....	50.2	47.0	51.9	45.8	36.0
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44) <sup>3</sup> .....	2.5	2.2	3.0	2.4	2.3
Rheumatism, acute and chronic (58, 59).....	5.9	6.0	6.8	6.1	4.5
Neurasthenia and the like (part of 84d).....	2.0	2.1	2.6	2.2	1.4
Neuralgia, neuritis, sciatica (87b).....	4.0	3.6	4.0	3.2	2.5
Other diseases of nervous system (80-85, 87, except part of 84d, and 87b).....	1.7	2.1	2.2	2.0	1.4
Diseases of heart and arteries, and nephritis (90-99, 102, 130-132).....	8.9	8.0	8.7	7.5	5.2
Other diseases of genitourinary system (133-138).....	3.5	3.6	3.6	3.6	2.8
Diseases of skin (151-153).....	4.0	3.3	3.8	3.5	3.1
Diseases of organs of movement except diseases of joints (156b).....	4.1	3.7	3.9	3.7	3.2
All other diseases (45-57, 60-79, 83, 89, 100, 101, 103, 154, 155, 159a, 157, 162).....	13.6	12.4	13.3	11.6	9.6
III-defined and unknown causes (200).....	6.8	6.3	6.2	5.9	3.6
Average number of males.....	196, 472	230, 906	212, 819	241, 206	1, 207, 351

<sup>1</sup> Industrial injuries and venereal diseases are not included.

<sup>2</sup> Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.

<sup>3</sup> Exclusive of influenza and grippé, respiratory tuberculosis, and venereal diseases.

The varying total third-quarter frequency reveals an upward trend from 1939 to 1945. The rate for 1945 is 70 percent above the minimum rate recorded for 1939, and 33 percent above the mean rate (90.4 absences per 1,000) for the 10-year period.

The total fourth-quarter rate also tended to increase from 1939 to 1945. The 1945 rate is almost twice the minimum rate for 1939, and over 45 percent above the mean (108.3 absences per 1,000) for the 10 years.

Of interest in figure 1 is the behavior of the third- and fourth-quarter rates for the group of nonrespiratory-nondigestive diseases. Although the rates for each quarter rise steadily from 1938 through 1945, the yearly change from 1938 to 1942 is slight, becoming somewhat more marked from 1942 to 1945. The greatest yearly increase



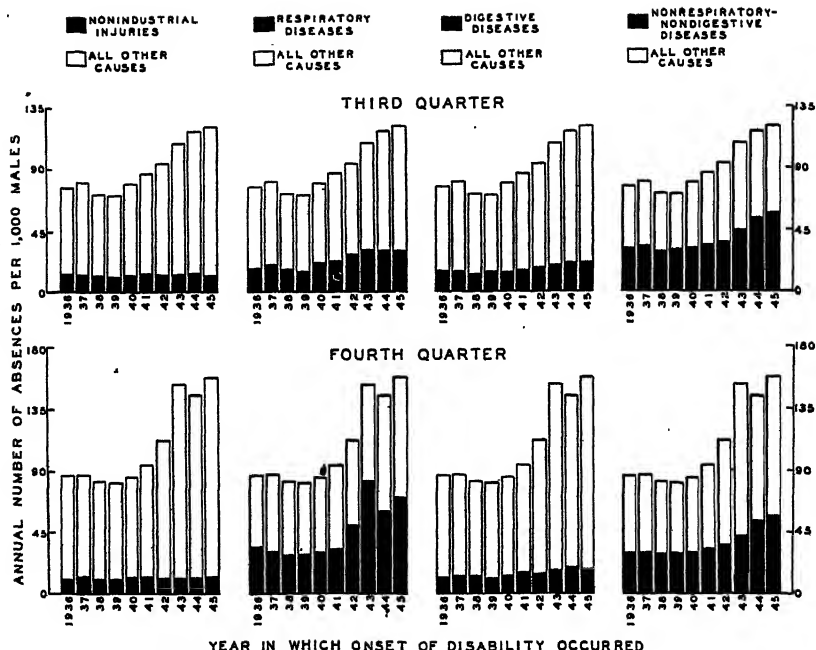


FIGURE 1.—Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by broad cause group; experience of MALE employees in various industries, third and fourth quarters of years 1936-45, inclusive. (Each bar for a particular year represents average annual frequency from all sickness and nonindustrial injuries, and contribution made to that frequency by a particular cause group. Nonrespiratory-nondigestive diseases include "ill-defined and unknown causes.")

recorded for either the third or fourth quarter occurs in these last 3 years and is approximately 25 percent.

Attention is directed also to the fourth-quarter respiratory rates, which reveal frequencies of epidemic magnitude in 1943 and 1945.

*Nonrespiratory-nondigestive diseases.*—The gradual increase in the third- and fourth-quarter rates for the group of nonrespiratory-nondigestive diseases during the 10-year period under consideration results in rates for 1945 which are well above those recorded for the early years of the decade. Additional information on the cumulative effect of the yearly increases is given in table 3 which presents average annual frequency rates for the third and fourth quarters of the initial and terminal years of the period according to specific nonrespiratory-nondigestive causes.

Table 3 reveals a number of notable relationships which may be briefly summarized as follows:

(1) For each specific cause as well as for the total group of nonrespiratory-nondigestive causes the rates for 1945 are higher than the corresponding rates for 1936, the excesses in the third- and fourth-quarter rates for the group of nonrespiratory-nondigestive diseases being 82 and 90 percent, respectively.

TABLE 3.—Average annual number of absences per 1,000 males on account of non-respiratory-nondigestive diseases disabling for 8 consecutive calendar days or longer, experience of MALE employees in various industries, third and fourth quarters of 1945 compared with third and fourth quarters of 1936

Cause	Annual number of absences per 1,000 males					
	Third quarter			Fourth quarter		
	1945	1936	Percentage change 1936 to 1945	1945	1936	Percentage change, 1936 to 1945
Nonrespiratory-nondigestive diseases.....	57.0	31.4	+82	57.0	30.0	+90
Infectious and parasitic diseases.....	2.5	1.4	+79	2.5	1.7	+47
Rheumatic diseases <sup>1</sup> .....	13.9	9.5	+46	14.0	8.7	+61
Diseases of nervous system <sup>2</sup> .....	5.4	2.1	+157	3.7	2.0	+85
Diseases of heart and arteries, and nephritis.....	8.0	3.3	+142	8.9	3.4	+162
Other diseases of genitourinary system.....	4.2	2.2	+91	3.5	2.1	+67
Diseases of skin.....	4.0	3.8	+5	4.0	3.3	+21
Ill-defined and unknown causes.....	5.8	3.1	+87	6.8	3.2	+112
All other diseases.....	13.2	6.0	+120	13.6	5.6	+143

<sup>1</sup> Including rheumatism, acute and chronic; neuralgia, neuritis, and sciatica; and diseases of organs of movement except diseases of joints.

<sup>2</sup> Including neurasthenia and the like; and "other diseases of nervous system."

(2) With the exception of diseases of the skin the excesses in the third- and fourth-quarter rates for 1945 are over 45 percent for each of the specific causes.

(3) Particularly notable are the increases recorded for diseases of the heart and arteries, and nephritis—the 1945 rate for both the third and fourth quarter being approximately two and one-half times the corresponding rate for 1936.

(4) Striking increases in 1945 are also shown in each quarter for diseases of the nervous system, and "all other diseases," the latter group including, among others, such causes as diseases of the eyes and ears, diseases of the veins, high blood pressure, and other diseases of the circulatory system (except diseases of the heart and arteries).

(5) In each of the 2 years the third- and fourth-quarter rates for particular causes are remarkably stable, denoting the general absence of seasonal variation in the rates.

*Comment.*—In any comparison of rates for 1945 and 1936 reference must be made to the different economic conditions prevailing in the 2 years, and the changes in the character of the labor force under observation. The year 1936 was part of a period of economic depression while the year 1945 was part of a war period. Thus the selection of the industrial population in respect of age, fitness, and many other factors must be taken into consideration. A quantitative evaluation of the effects of many of these factors is difficult. Nevertheless all relevant factors must be borne in mind in any interpretation of the data.

## AN EPIDEMIC OF A SEVERE PNEUMONITIS IN THE BAYOU REGION OF LOUISIANA

### VII. HISTOPATHOLOGY IN LABORATORY ANIMALS<sup>1</sup>

By G. L. FITE, *Surgeon*; C. L. LARSON, *Passed Assistant Surgeon*; and B. J. OLSON, *Surgeon, United States Public Health Service*

#### INTRODUCTION

The tissues of laboratory animals infected by the agent of Louisiana pneumonitis (the epidemiological, clinical, pathological, and etiological aspects of which have been described in previous papers of this series (1, 2, 3, 4, 5, 6) were subjected to histological examination. A majority of the animals were inoculated with suspensions of infected yolk sacs of chicken embryos, a few with suspensions of infected animal tissues, and a moderate number with suspensions of tissues obtained from human cases. A group of 98 animals inoculated with the agent of meningopneumonitis and a group of 108 animals inoculated with strains of psittacosis virus were also studied. The strains of these viruses were those employed in the previously reported studies on the etiology of Louisiana pneumonitis (4, 5, 6). The route of inoculation and the species of animals inoculated with Louisiana pneumonitis virus are shown in table 1. All tissues were stained with Giemsa stains which are effective in demonstrating elementary bodies.

The lesions produced in animals by inoculation of Louisiana pneumonitis virus varied according to the species of animal used and the route of inoculation employed, but the source of this virus did not influence the type of lesions. Mice, guinea pigs, and cotton rats showed extensive lesions. Lesions were also observed in hamsters and albino rats, but these were of limited extent. Characteristic lesions were not found in the other species of animals studied.

#### MICE

##### LESIONS FOLLOWING INTRAPERITONEAL INOCULATION OF VIRUS

Lesions were consistently found in the livers and spleens and were also noted in the other organs of mice which had been inoculated intraperitoneally with the agent of Louisiana pneumonitis. In some mice, a small amount of peritoneal exudate, together with a slight cellular infiltration of the omental tissues, was noted, but these findings were also noted in certain of the other animals studied.

The lesions seen in mice inoculated intraperitoneally with dilute suspensions of infective material were uniformly much less extensive than those seen in mice inoculated with larger doses of virus, but were of the same type.

<sup>1</sup> From the Pathology Laboratory and the Division of Infectious Diseases, National Institute of Health.

TABLE 1.—*Species and number of animals inoculated, by various routes, with Louisiana pneumonitis virus*

Animals inoculated	Method of inoculation				Number of inoculations
	Intraperitoneal	Subcutaneous or intramuscular	Intranasal	Intracerebral	
Mice.....	129	16	24	17	186
Guinea pigs.....	49				49
Cotton rats.....	12			2	14
Albino rats.....	12			3	15
Muskrats.....	10		11		21
Hamsters.....	9			4	13
Deer mice.....	9				9
Rice rats.....	4				4
Nutria.....	5		9		14
Ferrets.....	2				2
Monkeys.....			3		3
Total.....	241	16	47	26	330

TABLE 2.—*Mice showing visceral lesions following intraperitoneal inoculation of the virus of Louisiana pneumonitis, according to dosage and duration of the disease from time of inoculation*

Duration in days	Dose (dilution of infective tissue)			
	1:100		1:10,000	
	Number of mice inoculated	Number of mice with lesions	Number of mice inoculated	Number of mice with lesions
1.....	8	4		
2.....	11	8		
3.....	9	8		
4.....	7	6	7	4
5.....	9	8		
6.....	15	15	8	8
8.....	5	4		
9.....			6	8

*Liver*.—Two intermingling types of lesions were observed in the liver. In one of these types there was early occurrence of sinusoidal fibrin thrombi which subsequently led to necrosis of a few neighboring liver cells. This type of lesion was unusual in mice, and was seen only in extensively involved tissues. The other type, which began with enlargement of Kupffer cells, was common. The Kupffer cells were joined by monocytes and lymphocytes and, later, by polymorphonuclear leucocytes to form small focal lesions scattered throughout the liver. A few necrotic liver cells were included in these foci. Deposition of fibrin was found in all these foci but this did not appear to be the earliest change. These foci began in sinusoids as accumulations of cells which later became necrotic. Elementary bodies were found in mononuclear cells and lying free in necrotic areas of certain of the larger focal lesions, but they were present in only a very small

percentage of the total number of foci. Organization of the lesions manifested by the appearance of fibroblasts and the development of cells into ordinary histiocytes was seen in animals surviving to the eighth day. Occasionally, extremely large foci presented the appearance of abscesses.

*Spleen.*—Similar focal lesions were regularly found in the spleens of infected mice, and were accompanied by fibrin deposits in the nearby splenic sinuses, as well as by the deposition of much fibrin in the necrotic centers of the foci. In some animals stains for fibrin showed fibrin thrombi which were not accompanied by cellular exudates but these were never extensive. An increase or prominence of the cells of the pulp, and to a less degree of the endothelium of the sinuses was also present in variable degree. Elementary bodies were noted in the inflammatory foci and in mononuclear cells in the centers of malpighian bodies. The amount of cellular degeneration and phagocytosis in the germinal centers of the malpighian bodies was always increased above the normal. Focal necrotic lesions occurred at the margins of malpighian bodies extending into the pulp. The malpighian bodies were rarely involved.

*Lung.*—In the majority of mice inoculated intraperitoneally no changes occurred in the lungs. About a third of the mice showed small or minute interstitial cellular foci in the lungs which were of the same character as those observed in the liver. Small fibrin thrombi in the capillaries and small blood vessels were present in and about the larger foci. The smaller foci consisted of a collection of a few interstitial mononuclear cells in the alveolar walls, marked swelling of the endothelium of the vessels, and occasionally a few alveolar phagocytes in adjacent alveoli. Larger foci also showed a few polymorphonuclear leucocytes as well as fibrin deposits, but these foci were rarely as prominent as those in the liver and occurred only in animals with severe involvement.

In 13 mice, additional lesions occurred in the lungs and mediastinum. These consisted of proliferation of large mononuclear cells along and in the outer walls of the main pulmonary vessels, both arteries and veins. These were probably the result of extension of infection along the lymphatics of the blood vessels. In the mice showing relatively few lesions, the presence of these large mononuclear cells in the edematous outer vascular coats were the only abnormal finding. In mice showing more extensive involvement there was spread of the infiltrating cells into mediastinal fat lobules and mediastinal lymph nodes. In these necrotic areas with deposit of much fibrin, many polymorphonuclear leucocytes were found. In 2 animals necrotic lesions in contact with the pleural cavities gave rise to fibrinopurulent pleurisy, and in 3 animals a pericarditis resulted from extension from

the mediastinal lesions. The pericarditis was largely localized about the auricular appendages. Elementary bodies were readily demonstrated in the more advanced pulmonary and mediastinal lesions.

*Kidney.*—The kidneys of infected mice rarely manifested definitive lesions. A few showed rare capillary thrombi in glomeruli, and in two animals cellular foci like those in the liver were observed. Infiltration of mononuclear cells about the renal pelvis was seen occasionally. Acute glomerulonephritis of a nonspecific nature was seen in four mice with severe infections.

*Testis.*—Small infiltrative cellular foci were seen in 4 of the 29 testes examined. They were few in number and consisted of mononuclear cells in the neighborhood of small vessels plugged by fibrin thrombi.

*Brain.*—The brains of 20 mice inoculated intraperitoneally with Louisiana pneumonitis virus were examined. Five of these showed lesions which were moderate in one animal and slight in the others. The foci were similar to those seen in the testis and consisted of a few mononuclear cells about small vessels which infrequently contained obstructive fibrin thrombi. Usually the endothelium was prominent, and the walls of the vessels showed only slight degenerative changes consisting of partial chromatolysis of nuclei and granular changes in muscle fibers. Proliferation of glial cells was seen in a few foci but was not consistently present, even though granular degeneration of the ground substance immediately adjacent to the vessel occurred in some of the foci. Small infiltrations of mononuclear cells were found infrequently along vessels in the meninges.

*Intestine.*—Infiltrations of mononuclear cells in the submucosa were seen in animals with severe peritoneal reactions, but in three animals appeared independent of such a reaction.

*Lymph nodes.*—The changes in the mesenteric lymph nodes were, for the most part, slight. There was some blocking of the central and peripheral sinuses by phagocytic cells. Elementary bodies were rarely demonstrable in these nodes. Proliferative changes were usually absent. Necrotic foci of the mesenteric nodes were found in only 4 of 36 mice. The mediastinal lymph nodes showed changes in only those animals in which other mediastinal lesions were present. No general lymphoid tissue involvement was noted.

*Heart.*—Lesions were seen in the auricle of animals with pericarditis resulting from extension of mediastinal foci. In addition to the pericardial changes, there was marked prominence of the endothelium of the auricular appendages in these animals and some infiltration of the auricular walls by mononuclear cells. Foci of perivascular monocytes were rare in the epicardium, and in most cases the heart was normal.

*Nature of the infiltrating mononuclear cells.*—The nature of the cells which were seen in many of the early lesions, and which may constitute the only reaction, is uncertain. They have large, dark-staining nuclei which have large, indistinctly marked chromatin masses. Bilobed or twin nuclei are not uncommon. The cytoplasm is abundant, but most variable in tinctorial properties when Giemsa stain is used, the cytoplasm varying from a deep azure blue to a pale pink, and being free of granules. The cells have the appearance of immature cells of the lymphoid or monocyte series, and are similar to certain cells seen in animals and man suffering from typhus fever.

LESIONS FOLLOWING SUBCUTANEOUS OR INTRAMUSCULAR INOCULATION OF VIRUS  
(MICE)

The lesions which developed in the viscera of mice following introduction of virus by subcutaneous or intramuscular inoculation were identical with those which resulted from intraperitoneal inoculation of virus. Five days after inoculation, minimal lesions were present in two animals; moderate ones in two others; but in three mice no lesions developed. Eight days after inoculation, lesions were present in all of nine animals examined. The visceral lesions appear to develop more slowly and to be less extensive following subcutaneous or intramuscular inoculation than following intraperitoneal injection of virus. Of six animals in which the skin from the site of inoculation was examined microscopically, only one showed a small lesion containing a few elementary bodies.

LESIONS FOLLOWING INTRANASAL INOCULATION OF VIRUS (MICE)

The pulmonary lesions following intranasal inoculation of virus differed from those following intraperitoneal inoculation. In the former instance, lesions consisted of scattered patches of lobular pneumonia which were sometimes confluent and occupied most of an entire lobe. The trachea and large bronchi showed no changes even in the presence of extensive pneumonic lesions.

The pneumonic foci appeared grossly as white spherical masses scattered in various lobes, and microscopically consisted of a diffuse, massive fibrinous exudate into alveolar sacs accompanied by cellular exudate. Many alveoli were solidly plugged with coagulum made up of fibrin with occasional cells trapped in the coagulated fluids. The cellular foci were scattered: Some were present in thickened alveolar walls; some in alveoli; and they were most numerous and most recent at the margins of the fibrinous lesion. Bronchi contained within the lesions were patent and were either free of cells or fluid, or contained only a few cells and strands of fibrin. The cells consisted of polymorphonuclear leucocytes, large mononuclear cells, and small

and large lymphocytes. Eosinophiles were absent. Although many cells appeared interstitially in alveolar walls, the appearance was different from that of the usual interstitial pneumonia. Capillaries and small vessels in alveolar walls frequently showed fibrin thrombi.

Extension of the infectious process apparently along perivascular lymphatics, with the production of infiltrations of main pulmonary vessels was seen in three animals.

Five animals were examined 1 day after intranasal inoculation of virus. Edema was noted in the lungs of two mice; the presence of interstitial mononuclear cells was observed in the lungs of one mouse; and no changes were apparent in the lungs of the others.

Two days following intranasal introduction of virus, one animal showed a well-developed pneumonitis, and the lungs of another appeared to be normal.

Four days after intranasal introduction of virus, the lungs of three animals showed extensive pneumonitis; the lungs of two others showed edema, and no lesions were present in the lungs of another.

Six days following intranasal installation of virus, pneumonic areas were present in the lungs of all six animals examined. Two of these mice also had hepatic foci such as were produced by intraperitoneal inoculation of virus.

Fourteen days after intranasal injection of virus, the lungs of one animal appeared normal, while an organizing pneumonia was noted in another mouse.

Elementary bodies in variable numbers were readily demonstrable in pneumonic foci. They were most abundant in animals with infections of 4 days' duration and occurred in mononuclear cells in alveolar septa as well as in alveoli.

#### LESIONS FOLLOWING INTRACEREBRAL INOCULATION OF VIRUS (MICE)

Lesions were always present in mice which had been inoculated intracerebrally with 0.03-cc. doses of suspensions of infective tissue diluted  $10^{-5}$  in salt solution. Four mice receiving 0.03 cc. of a  $10^{-8}$  dilution of infective tissue, when examined on the twentieth day, showed no lesions, while two mice which received 0.03 cc. of a  $10^{-5}$  dilution of this tissue, killed on the twenty-eighth day following inoculation, showed extensive meningeal lesions. The lesions appeared to reach their height in about 6 days after intracerebral injection of virus. The lesions produced by intracerebral introduction of virus differed markedly from those produced by intraperitoneal inoculation of infective material. Meningitis and direct extensions of lesions of slight degree were present in brain tissues of all animals.

The meningeal reaction was similar to that seen in other tissues, except that deposits of fibrin were much less extensive. The cellular



exudate was not diffusely spread over the cerebral hemispheres and cerebellum of all mice. In less extensive cases, the exudate accumulated in sulci, or over limited areas, with only traces in the cerebellar meninges. There was little tendency for the exudate to accumulate at the base of the brain or along large vessels.

The cells of the exudate consisted largely of two types—the large mononuclear cells previously described, and polymorphonuclear leucocytes. In the slightly involved areas the former predominated. Segmented leucocytes tended to accumulate in foci. The meningeal reaction often appeared to be focal. The lack of extravasation of serous fluid into the meningeal spaces gave the appearance of a “dry” meningitis, the cells being closely packed together and closely applied to the brain surface. Fibrin thrombi in meningeal vessels were not seen. Extension into ventricles was minor and was frequently absent. Elementary bodies were readily demonstrated in the more extensively involved areas. Slight extension of the infectious process from the meninges into the brain tissue along sulci and cortical Virchow-Robin spaces and, frequently, along the hippocampal fissure into the hippocampus and dentate fascia occurred. Extension appeared to follow the blood vessels. Destruction of brain tissue was slight, and indiscriminately affected the various components of the brain tissue, causing disintegration of the ground substance and cells in the involved area. The vessels involved in these extensions into the brain tissue contained fibrin thrombi. Degenerative changes of the walls of these vessels were also present. Elementary bodies were noted within the brain tissue proper in a few instances: in one animal elementary bodies were found in phagocytic cells which resembled oligodendroglia.

#### GUINEA PIGS

##### LESIONS FOLLOWING INTRAPERITONEAL INOCULATION OF VIRUS

The lesions produced in guinea pigs following intraperitoneal inoculation of virus differed from those produced in mice infected by this route of inoculation.

*Peritoneum.*—In mice the peritoneal reaction was slight or absent, but in guinea pigs a peritoneal reaction usually occurred. This consisted of a small or moderate amount of plastic fibrinous exudate in the peritoneal cavity. The exudate was adherent to peritoneal surfaces, especially in the clefts between the lobes of the liver, in the omentum, and around the pancreas and spleen. In some instances only a few tags of fibrin were present. In other instances moderate numbers of leucocytes were present in the fibrinous exudate, and mononuclear cell infiltration of the omental fat was observed. Only

4 out of 47 animals showed more than a moderate amount of peritoneal reaction.

*Liver.*—In one experiment a series of animals were inoculated intraperitoneally with 0.5 cc. of a  $10^{-2}$  or a  $10^{-4}$  dilution of infective yolk-sac suspension in 0.85-percent salt solution. Tissues for microscopic study were taken from animals that died as a result of infection or were killed at random by ether anesthesia. Tissues from seven guinea pigs were obtained 4 days after inoculation of infective material, from eight animals 6 days after inoculation, and from seven guinea pigs 9 or 10 days after intraperitoneal introduction of virus. The lesions in animals receiving the smaller amount of virus were about as extensive as those receiving the larger amount of infective material. Four days following infection, the livers of three animals showed only minimal lesions and were normal in the other four guinea pigs. The changes noted consisted of rare fibrin thrombi in sinusoids and prominence of Kupffer cells. Six days following infection, seven of eight animals showed well-developed hepatic changes, and at the 9- and 10-day intervals all seven animals studied showed lesions. In another group of nine guinea pigs, the liver in eight had lesions 6 days after administration of an infective amount of virus. Ten days following infection the lesions had a distinctly older appearance. There was beginning organization of cellular exudates and appearance of fibroblasts and histiocytes.

The lesions in the severely infected guinea pigs were striking because of the extent of formation of fibrin thrombi in hepatic sinusoids, often without cellular exudates and because of the formation of very numerous small foci of necrotic liver cells. Some necrotic foci were related to the fibrin thrombi; others were not. A majority of the necrotic liver-cell foci were unaccompanied by a cellular reaction, but leucocytes were present about some of them, producing lesions similar to those observed in the liver of infected mice. The necrotic liver cells showed oxyphilia of the cytoplasm and partial chromatolysis of nuclei. In foci containing leucocytes, total disintegration of liver cells was seen. In some animals, brightly stained oxyphilic cells were widely scattered throughout the liver.

*Spleen.*—Hyaline fibrin thrombosis of the pulp vessels was the most important change occurring in the spleen. This extended through the entire organ of animals with severe infections and produced a curious fibrin web which appeared to occupy the entire capillary vascular bed of the spleen. There was considerable variation in the extent to which the spleen was involved in individual animals, but fibrinous changes were present to some degree in all animals with lesions. No changes other than the fibrin thrombi were seen in eight guinea pigs. There

were many polymorphonuclear leucocytes throughout the pulp of the spleens of two animals. In addition, there were focal aggregations of segmented leucocytes and mononuclear cells similar to those noted in infected mice and in 10 guinea pigs. No elementary bodies were identified.

*Lung.*—No lesions were present in the lungs of most of the guinea pigs but small interstitial septal foci of mononuclear cells were encountered in seven animals. A single animal showed numerous septal foci with many capillary thrombi, segmented leucocytes, and slight spilling over of these cells into alveoli.

*Kidney.*—No typical changes were found in the kidneys of the 31 guinea pigs examined. A single animal showed many small fibrin thrombi in glomerular capillaries, but no other changes.

*Lymph nodes.*—Slight changes were seen in mesenteric lymph nodes of 8 of 22 animals examined at various stages of infection. These consisted in filling of lymphatic channels with debris and phagocytic cells. They were considered to be similar to the usual changes encountered in mesenteric nodes following bacteria peritonitis or other septic conditions.

*Testis.*—Three of eight testes examined showed a few small interstitial foci consisting of fibrin clots in small vessels with infiltration of mononuclear cells along the adjacent tubules.

*Brain.*—The brains of 20 animals inoculated intraperitoneally were examined. Lesions were observed in the brains of 5 guinea pigs. These lesions consisted of small foci of glial cells lying adjacent to blood vessels associated with some granular degeneration of the ground substance in the area. No changes in the blood vessels themselves were seen. In one of the 5 animals exhibiting brain lesions, foci were numerous in the cerebellum and rare elsewhere; in the other 4 only a few foci were seen and these were mainly in the midbrain; in two of these 4 animals there were a few infiltrating mononuclear cells along an occasional vessel in the meninges. The lesions of the brain were indistinguishable from similar foci described in guinea pigs infected with typhus and spotted fever.

No elementary bodies were identified in any of the lesions occurring in guinea pigs. Although errors may have been made in making too fine distinctions here, it is certain that they do not occur in the numbers seen in mice.

#### COTTON RATS

##### LESIONS FOLLOWING INTRAPERITONEAL INOCULATION OF VIRUS

Twelve cotton rats (*Sigmodon hispidus*) were inoculated intraperitoneally with suspensions of Louisiana pneumonitis virus and examined histologically 4 to 7 days later. They showed an extremely

heavy, plastic, fibrinous peritonitis, with thick tenacious fibrinous membranes adherent to most of the peritoneal surfaces of the abdominal viscera. Microscopically these membranes were found to include considerable numbers of segmented leucocytes and mononuclear cells, sometimes accumulated in foci. In these areas elementary bodies were abundant and occurred both intracellularly and extracellularly. The intracellular bodies were coccoid in appearance whereas the extracellular bodies often showed an indistinct bacillar form. They appeared to have been released from necrotic cells and to have undergone rapid degeneration thereafter. In some cases the liver tissue underlying plastic exudates showed superficial areas of necrosis and other degenerative changes.

The mesenteric lymph nodes were little altered, showing no characteristic lesions but contained phagocytes and cellular debris. Elementary bodies were seen in one of five mesenteric nodes examined.

*Liver.*—Only 2 of the 12 livers examined showed definite changes consisting of small cellular foci originating in sinusoids. There were no fibrin thrombi.

*Spleen.*—The spleen was normal in three animals, and showed varying degrees of change in nine cotton rats. The spleen from one animal was extensively involved and contained fibrin thrombi and cellular foci, the cells of which contained elementary bodies. The spleen of three of the remaining eight cotton rats showed only trivial changes such as infrequent fibrin deposits and some increase in splenic pulp cells. Even in the other five animals the changes were slight compared to those observed in the spleens of infected mice. The extremely slight involvement of the liver and spleen present in cotton rats was in sharp contrast to the copious peritoneal exudate.

*Lung.*—The lungs of 1 cotton rat showed a few septal foci of mononuclear cells, in which elementary bodies were absent. The lungs of the other 11 animals were normal.

*Kidney.*—The kidneys of 1 cotton rat contained numerous fibrin thrombi in glomerular capillaries and about 50 to 60 percent of the glomeruli were involved. The kidneys of another animal had a few infiltrations of mononuclear cells and a few segmented leucocytes in glomeruli. The kidneys in the other 10 animals were normal.

*Brain.*—The brains from four cotton rats were studied but no lesions were observed.

#### LESIONS FOLLOWING INTRACEREBRAL INOCULATION OF VIRUS

The brains of two cotton rats inoculated intracerebrally with Louisiana pneumonitis virus showed extensive meningitis. The brain of one animal, which died 8 days after inoculation, had a pure

meningitis with extensive involvement of the choroid plexus and ventricles. The brain of the other, which died 6 days after inoculation, showed marked extension of the process along the superficial vessels into the outer parts of the cortex and several fibrin thrombi in small and medium-sized meningeal vessels. Elementary bodies were abundant in both animals.

#### WHITE RATS

No lesions were observed in two rats killed 24 hours after intraperitoneal inoculation with Louisiana pneumonitis virus. Two animals were studied on the fourth day after infection. One of these showed extensive capillary thrombosis in the lung, liver, and spleen, extensive oxyphilic necrosis of liver cells, and slight mononuclear cell infiltration in conjunction with the thrombi. The diffuse thrombosis of splenic capillaries was similar to that observed in guinea pigs. The other animal had only a few cellular foci in the liver and rare fibrin thrombi in the spleen.

Four of five animals killed 21 days after intraperitoneal inoculation with infective material showed extensive, obviously older, lesions of liver and spleen; the fifth rat had only a few foci. In three rats, the older organizing lesions contained nests of polymorphonuclear leucocytes in addition to mononuclear cells and histiocytes. Small numbers of fibrin thrombi occurred in splenic vessels, but were shrunken and appeared to be undergoing dissolution. In the liver, fibrin thrombi were rare. The lesions in both tissues appeared well localized. A few definite elementary bodies were identified in the liver of a single animal at 21 days. Septal foci of moderate size were present in the lungs of two animals and foci in the kidney were noted in one rat. The brains contained no lesions. Three rats which had been inoculated intracerebrally with infective material and which were killed 7 days later showed meningitis. The meningitis was extensive in two rats and moderate in the other. The process showed considerable extension along superficial vessels of the brain in the animal with the greatest involvement. There were occasional thrombi and degenerative changes in the vessels, and the adjacent brain tissue was involved. Elementary bodies were plentiful in this animal.

#### MUSKRATS

No distinctive lesions were observed in the tissues of 10 muskrats which had been inoculated intraperitoneally with infective material. One animal showed a slight fibrinous peritoneal response and another showed a few cells infiltrating into the omentum. One muskrat, killed 16 days after inoculation, revealed atrophic or scarred foci in

the liver. Five muskrats, killed on the same day, had a few minute cellular aggregates in the sinusoids of the liver which resembled proliferated Kupffer cells and which may represent tissue response to the infective agent. The lungs of 11 muskrats inoculated intranasally with infective material showed no characteristic lesions. Pulmonary edema was noted in 2 animals, and bronchiectasis of some duration in another. All other tissues appeared normal.

#### HAMSTERS (*CRICETUS AURATUS*)

Four hamsters, which were killed 4 days after intraperitoneal inoculation with infective material, had lesions of varying extent in the livers and spleens. The tissues of two animals were extensively involved and there were numerous fibrin thrombi in liver, spleen, and kidney. There were many foci of oxyphilic necrotic liver cells, to which there was almost no cellular response. In the tissues of the other two animals a few small areas of liver-cell necrosis were seen, and fibrinocellular aggregates were observed in the spleens. A moderate to marked fibrinous peritonitis was present in each of the four animals. The hearts, lungs, and brains were normal. Elementary bodies were not observed. The tissues of five hamsters killed 4 weeks after intraperitoneal inoculation with infective material did not display lesions. The brains of four hamsters inoculated intracerebrally with high dilutions of suspensions of infected material showed no lesions when killed 21 days later.

#### DEER MICE (*PEROMYSCUS*)

Nine deer mice were examined. They had been inoculated intraperitoneally with suspensions containing infective material. They were killed and tissues obtained for further study. Three animals were killed 4 days after inoculation; two were killed after an 8-day interval, and four after a 21-day interval. Few foci were found in the spleen in one mouse killed at the end of 4 days and another at the end of an 8-day period. Both of these animals showed a slight degree of fibrinous peritonitis. All other tissues were normal.

#### RICE RATS

Four rice rats were killed 28 days after intraperitoneal inoculation with infective material. A few minute nondescript cellular aggregates in the livers of two animals, and pigment deposits in the livers of the other 2 rice rats were the only lesions noted.

#### NUTRIA (*MYOCASTOR COYPU*)

Five nutria were killed and examined 21 or 22 days after intraperitoneal inoculation with infective material. No lesions were noted in

any of the tissues. The lungs of nine nutria inoculated intranasally with infective material and killed 14 days later had no lesions attributable to the infectious agent, although four showed chronic lesions attributable to the aquatic habits of the animal.

#### FERRETS

Two ferrets inoculated intraperitoneally with infective material showed no lesions when killed after an interval of 22 days.

#### MONKEYS (*MACACUS RHESUS*)

The tissues of three monkeys which had been inoculated intranasally with sputum and intraperitoneally with suspensions of tissues from human cases showed no lesions. The material inoculated into the monkeys was infective for mice and guinea pigs.

#### HISTOLOGIC SUMMARY

Table 3 illustrates the difference in severity and distribution of lesions in mice, guinea pigs, and cotton rats.

TABLE 3.—*Distribution and severity of lesions, by species of animal*

	Mice	Guinea pigs	Cotton rats
Plastic peritonitis.....	Trace	+	++++
Liver:			
A. Cellular foci.....	++++	+	Rare
B. Fibrin thrombi.....	+	++++	0
C. Liver-cell necrosis.....	+	++++	0
Spleen:			
A. Cellular foci.....	++++	++	+
B. Fibrin thrombi.....	+	++++	Rare
Lung and mediastinum intraperitoneal inoculation.....	++	+	Rare
Kidney.....	Rare	Rare	+
Brain:			
A. Vascular changes.....	+	0	
B. Glial foci.....	0	+	
Testis.....	Rare	Rare	
Heart.....	Rare	Rare	0

#### COMPARISON OF THE LESIONS PRODUCED IN ANIMALS BY LOUISIANA PNEUMONITIS, PSITTACOSIS, AND MENINGOPNEUMONITIS VIRUS

*Comparison of lesions produced by intraperitoneal and intracerebral inoculation.*—The lesions produced in mice following inoculation with the virus of meningopneumonitis, Francis and Magill (7), or of psittacosis virus, Rivers and Berry (8), closely resemble those produced in mice following infection with Louisiana pneumonitis virus. The lesions produced in pocket gophers by infection with psittacosis virus, Lillie and Hoge (9), likewise resemble the lesions produced in guinea pigs infected with Louisiana pneumonitis virus.

In the present studies the similarity of the lesions produced in mice by inoculation with these three agents was confirmed. The strains of psittacosis and meningopneumonitis employed generally produced less extensive lesions than did the strain of Louisiana pneumonitis virus, but the lesions of animals with severe infections due to the viruses of psittacosis and meningopneumonitis were indistinguishable from lesions caused by the Louisiana pneumonitis virus. Elementary bodies of similar appearance were observed in mice suffering from infection with any of the agents. The strain of meningopneumonitis virus employed tended to produce isolated large necrotic lesions in the liver, a tendency not displayed by the other viruses.

Rivers and Berry (8) reported meningeal lesions in rabbits and guinea pigs inoculated intracerebrally with the psittacosis virus. In the present study 20 of 24 mice inoculated intracerebrally with the agent of meningopneumonitis showed meningeal lesions indistinguishable from those produced by intracerebral inoculation of Louisiana pneumonitis virus. Two cotton rats injected intracerebrally showed the same type of meningeal exudate together with slight extension of the exudate into brain tissue along the blood vessels. Five cotton rats were inoculated intraperitoneally with the meningopneumonitis virus and of these four remained normal and were killed 30 days later. No lesions were noted in this group of four animals. The other cotton rat died on the eleventh day after inoculation; fairly extensive lesions of the liver, lungs, and mediastinum, similar to those seen in mice infected with Louisiana pneumonitis virus, were found.

Our studies indicate that the viruses of psittacosis, meningopneumonitis, and Louisiana pneumonitis cannot be separated on the basis of the character of the lesions produced in experimental animals inoculated intraperitoneally or intracerebrally with the three agents.

*Comparison of lesions produced by intranasal inoculation.*—Intranasal inoculation of the agents of psittacosis and meningopneumonitis into mice produced lesions distinctly different in distribution from those resulting from intranasal inoculation of Louisiana pneumonitis virus into mice. In psittacosis and meningopneumonitis infections, interstitial spread of the pneumonic process was a characteristic feature. In infections with Louisiana pneumonitis virus the interstitial manner of spread was lacking. The pneumonic areas were sharply outlined and interstitial infiltrations along bronchi and bronchioles were absent. The lesions in lungs which were only slightly involved consisted of small pneumonic patches, with intervening areas of normal lung tissue. In this study, the lesions produced in mice by intranasal inoculation of suspensions containing Louisiana pneumonitis virus offered the only histologic basis for the distinction



of the Louisiana pneumonitis virus from the viruses of psittacosis or meningopneumonitis.

RELATION OF THE LESIONS PRODUCED IN ANIMALS BY LOUISIANA PNEUMONITIS VIRUS AND THE RICKETTSIAE

The many studies of the rickettsial diseases, especially typhus and Rocky Mountain spotted fever, in laboratory animals, Mooser (10), Hach (11), and Lillie and Dyer (12), have shown that in these diseases the viscera of infected guinea pigs are not involved to the same degree as are the viscera of guinea pigs infected with Louisiana pneumonitis virus or the viruses of psittacosis and meningopneumonitis. Occasional foci are found in the brains of certain guinea pigs inoculated intraperitoneally with Louisiana pneumonitis virus and these bear a close similarity, or even identity, to those seen in guinea pigs similarly infected with typhus or spotted fever virus. Although the lesions are less extensive and less well developed, their relation to blood vessels appears to be the same as that of the lesions noted in the rickettsial diseases. The foci in the testes of guinea pigs infected with Louisiana pneumonitis virus are also similar to lesions seen in the testes and scrotum of guinea pigs infected with rickettsiae of typhus fever. The presence of infiltrating mononuclear cells is reminiscent of typhus fever infections. The tendency of Louisiana pneumonitis virus and the viruses of psittacosis and meningopneumonitis to produce fibrin thrombi in capillaries is far greater than that of typhus fever rickettsiae.

SUMMARY AND CONCLUSIONS

The virus of Louisiana pneumonitis produces extensive lesions in mice, guinea pigs, and cotton rats, following intraperitoneal inoculation. In albino rats and hamsters, lesions are produced by large doses of the infecting agent but the virus is infrequently lethal for these animals. Rice rats, muskrats, ferrets, deer mice, nutria, and rhesus monkeys are not susceptible to infection with this virus. The variation in the quality of the lesions produced in mice, guinea pigs, and cotton rats by the Louisiana pneumonitis virus must be considered one of its distinctive features. In mice infected intraperitoneally or intracerebrally the lesions produced are probably indistinguishable from those caused by the viruses of psittacosis and meningopneumonitis. In mice infected intranasally with Louisiana pneumonitis virus the resulting pneumonic process shows material differences from the lesions in mice similarly inoculated with the other agents. There is no bronchial involvement and no tendency toward interstitial spread of infection in the lungs of mice infected with the agent under study.

The infection in guinea pigs is characterized by extensive fibrinous thrombosis of capillaries and sinuses of the liver and spleen, with comparatively less cellular reaction than observed in the mouse.

An extensive plastic fibrinous peritonitis constitutes the chief alteration in cotton rats. Comparatively trivial changes occur in the organs.

Animals intracerebrally inoculated show a dry meningitis with slight extension of the process into the superficial brain tissues along the blood vessels. Mice and guinea pigs infected intraperitoneally occasionally may show lesions in the brain similar to those occurring in guinea pigs infected with the rickettsia of typhus fever or spotted fever.

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Single copies of this bibliography may be obtained without charge from Ralph J. VanDerwenker, Senior Sanitary Engineer (R), USPHS, Federal Public Housing Authority, Room 404 Longfellow Building, Washington 25, D. C.

## DEATHS DURING WEEK ENDED JUNE 29, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 29, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	8, 557	8, 747
Average for 3 prior years.....	8, 884	
Total deaths, first 26 weeks of year.....	248, 525	243, 311
Deaths under 1 year of age.....	623	561
Average for 3 prior years.....	615	
Deaths under 1 year of age, first 26 weeks of year.....	16, 069	15, 908
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67, 206, 517	67, 377, 490
Number of death claims.....	11, 797	14, 291
Death claims per 1,000 policies in force, annual rate.....	9. 2	11. 1
Death claims per 1,000 policies, first 26 weeks of year, annual rate.....	10. 3	10. 9

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED JULY 6, 1946

#### Summary

The number of reported cases of poliomyelitis increased from 273 to 311. The largest increases were in the West North Central area (from 30 to 48), South Atlantic (from 34 to 54), and the East South Central (from 19 to 40). The only other area which reported an increase was the New England (from 1 to 4 cases). Of the current total, Texas reported 45 cases, Florida 32, Alabama 25, Colorado 22, and Minnesota 20—approximately 47 percent in these 5 States. The total to date this year is 2,167 cases, as compared with 1,425 for the same period in 1945, 1,290 in 1944, and 1,329 in 1943. The largest State totals this year are as follows (last year's corresponding totals in parentheses): Texas 337 (312), Florida 314 (29), California 236 (116), Alabama 122 (67), Colorado 104 (8). Rhode Island and Nevada are the only States which have reported no cases to date this year.

The increase in diphtheria, which began in 1945, continues, and the incidence is above that for last year and the 5-year (1941-45) median. The current incidence is about 50 percent above that for the corresponding weeks of recent years, and to date a total of 8,628 cases has been reported, as compared with 6,897 in 1945 and a 5-year median of 6,487 for the same period.

Two cases of smallpox were reported during the week, 1 each in Wisconsin and Texas. The outbreak on the West Coast brought the total to date (256) above last year's figure (248) for the same period.

A total of 7,885 deaths were reported in 93 large cities in the United States, as compared with 8,557 last week, 8,637 for the same week of 1945, and a 3-year average of 8,121 for the week. The cumulative total to date is 256,410, as compared with 251,948 for the same period last year.

*Telegraphic morbidity reports from State health officers for the week ended July 6, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	July 6, 1946	July 7, 1945		July 6, 1946	July 7, 1945		July 6, 1946	July 7, 1945		July 6, 1946	July 7, 1945	
NEW ENGLAND												
Maine.....	0	0	0	—	—	—	78	3	32	0	0	1
New Hampshire.....	0	0	0	—	—	—	4	—	11	0	0	0
Vermont.....	1	0	0	—	—	—	116	23	61	0	0	0
Massachusetts.....	3	5	2	—	—	—	711	250	365	0	4	5
Rhode Island.....	0	2	0	—	22	—	34	—	13	0	0	0
Connecticut.....	1	1	1	2	—	—	211	34	124	1	2	2
MIDDLE ATLANTIC												
New York.....	12	9	8	13	14	11	1,188	72	605	5	10	10
New Jersey.....	2	1	1	2	—	—	528	61	285	2	2	3
Pennsylvania.....	17	2	5	3	1	—	467	261	226	8	7	7
E. NORTH CENTRAL												
Ohio.....	13	4	3	—	6	4	528	24	68	1	7	1
Indiana.....	4	4	4	—	6	2	46	14	22	2	6	2
Illinois.....	3	2	7	—	3	4	210	246	236	3	11	8
Michigan <sup>1</sup> .....	1	7	3	—	—	1	269	50	296	1	4	4
Wisconsin.....	2	1	1	4	9	9	638	69	509	0	1	1
W. NORTH CENTRAL												
Minnesota.....	2	6	4	2	—	—	46	7	72	0	1	1
Iowa.....	3	1	1	—	—	—	78	34	52	1	0	0
Missouri.....	3	0	1	1	4	1	64	15	38	2	3	3
North Dakota.....	1	0	0	—	—	1	9	2	7	0	0	1
South Dakota.....	1	2	2	—	—	—	5	15	10	0	1	0
Nebraska.....	3	1	1	—	8	—	22	4	23	1	0	0
Kansas.....	15	2	3	—	—	—	18	11	51	2	1	1
SOUTH ATLANTIC												
Delaware.....	0	1	0	—	—	—	5	1	3	0	0	1
Maryland <sup>1</sup> .....	7	4	4	1	2	2	308	8	59	0	1	6
District of Columbia.....	0	0	0	—	—	—	50	1	28	2	3	2
Virginia.....	10	0	3	55	89	37	204	11	82	2	7	6
West Virginia.....	5	1	3	1	—	—	30	2	8	0	1	1
North Carolina.....	16	5	3	—	—	—	63	5	43	0	6	1
South Carolina.....	4	6	2	141	52	100	81	11	38	0	1	1
Georgia.....	1	5	2	2	2	6	16	5	15	3	0	1
Florida.....	4	2	2	4	—	5	66	8	13	3	0	1
E. SOUTH CENTRAL												
Kentucky.....	1	3	1	—	—	—	112	18	18	0	1	1
Tennessee.....	3	4	4	12	15	15	58	19	19	2	3	3
Alabama.....	4	0	2	4	—	8	85	—	13	1	0	1
Mississippi <sup>1</sup> .....	4	3	7	—	—	—	—	—	—	1	3	2
W. SOUTH CENTRAL												
Arkansas.....	0	5	2	2	3	6	31	11	21	0	1	1
Louisiana.....	6	4	4	12	—	1	32	14	15	0	1	1
Oklahoma.....	1	1	3	3	6	5	46	14	27	1	1	1
Texas.....	21	26	23	245	298	289	248	146	145	7	4	4
MOUNTAIN												
Montana.....	0	0	1	2	5	—	61	3	8	0	0	1
Idaho.....	0	2	0	8	—	—	11	12	12	1	0	0
Wyoming.....	2	0	0	—	—	—	6	1	9	0	0	0
Colorado.....	4	4	5	1	10	11	72	9	32	1	0	0
New Mexico.....	1	0	0	1	—	—	29	3	4	0	0	0
Arizona.....	4	7	2	6	19	22	48	8	19	0	0	0
Utah <sup>1</sup> .....	1	1	0	—	—	—	57	78	70	1	0	0
Nevada.....	0	0	0	—	—	—	1	1	3	0	0	0
PACIFIC												
Washington.....	2	8	8	—	—	—	62	134	121	1	1	1
Oregon.....	3	3	2	—	1	1	85	54	46	0	2	1
California.....	16	13	13	9	21	21	459	477	477	10	13	13
Total.....	207	158	138	526	581	581	7,544	2,249	4,763	65	109	109
37 weeks.....	8,628	6,897	6,487	188,732	67,055	78,564	619,943	93,442	517,735	4,029	5,528	5,528

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended July 6, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>3</sup>		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	July 6, 1946	July 7, 1945		July 6, 1946	July 7, 1945		July 6, 1946	July 7, 1945		July 6, 1946	July 7, 1945	
NEW ENGLAND												
Maine.....	1	1	0	2	23	7	0	0	0	1	0	1
New Hampshire.....	1	2	0	3	1	2	0	0	0	0	0	0
Vermont.....	0	0	0	4	3	3	0	0	0	0	1	0
Massachusetts.....	0	1	0	42	93	74	0	0	0	2	3	3
Rhode Island.....	0	0	0	3	4	4	0	0	0	0	0	0
Connecticut.....	2	7	1	16	8	14	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York.....	10	21	5	121	135	111	0	0	0	5	3	5
New Jersey.....	2	10	1	31	25	32	0	0	0	0	0	1
Pennsylvania.....	2	0	1	65	87	76	0	0	0	5	4	4
EAST NORTH CENTRAL												
Ohio.....	8	5	3	97	96	96	0	0	0	4	4	7
Indiana.....	2	0	0	15	22	13	0	0	0	3	0	2
Illinois.....	13	2	5	48	74	57	0	0	1	1	1	2
Michigan <sup>1</sup> .....	1	3	0	45	76	76	0	0	0	0	4	4
Wisconsin.....	0	0	0	42	52	47	1	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota.....	20	0	2	14	16	21	0	0	0	0	1	0
Iowa.....	7	2	2	22	8	9	0	1	0	0	0	0
Missouri.....	13	1	1	12	11	12	0	0	0	3	0	1
North Dakota.....	0	1	1	1	7	5	0	0	0	0	0	0
South Dakota.....	0	0	0	1	5	5	0	0	0	0	1	0
Nebraska.....	3	0	0	2	29	7	0	0	0	2	0	0
Kansas.....	4	1	1	10	18	15	0	0	0	0	2	2
SOUTH ATLANTIC												
Delaware.....	0	1	0	1	1	2	0	0	0	0	0	0
Maryland <sup>1</sup> .....	1	3	0	19	25	25	0	0	0	0	0	2
District of Columbia.....	0	0	0	3	10	9	0	0	0	1	0	0
Virginia.....	1	5	1	21	17	13	0	0	0	4	4	4
West Virginia.....	0	2	0	9	9	12	0	0	0	2	3	4
North Carolina.....	5	1	1	15	12	11	0	0	0	4	6	4
South Carolina.....	0	6	3	7	5	2	0	0	0	6	11	6
Georgia.....	15	5	4	4	5	6	0	0	0	8	5	11
Florida.....	32	0	2	8	1	2	0	0	0	3	4	4
EAST SOUTH CENTRAL												
Kentucky.....	4	1	2	4	7	7	0	0	0	0	6	9
Tennessee.....	4	18	3	7	15	14	0	0	0	1	3	3
Alabama.....	25	5	5	7	5	5	0	1	0	1	5	5
Mississippi <sup>1</sup> .....	7	1	1	5	4	2	0	0	0	2	3	6
WEST SOUTH CENTRAL												
Arkansas.....	11	0	1	0	3	2	0	0	0	6	3	5
Louisiana.....	14	3	1	1	7	5	0	0	0	2	8	8
Oklahoma.....	10	6	2	1	0	2	0	0	0	1	6	4
Texas.....	45	21	8	15	22	22	1	0	0	26	26	26
MOUNTAIN												
Montana.....	1	1	0	3	1	3	0	0	0	0	0	0
Idaho.....	0	0	0	0	2	2	0	0	0	1	0	0
Wyoming.....	1	0	0	0	3	3	0	0	0	0	3	0
Colorado.....	22	0	0	18	15	10	0	0	0	0	0	0
New Mexico.....	1	0	0	3	2	1	0	0	0	2	6	1
Arizona.....	3	0	0	4	2	3	0	0	0	1	0	1
Utah <sup>1</sup> .....	1	0	0	4	7	7	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	2	0	0	9	21	10	0	1	0	0	1	0
Oregon.....	0	0	0	4	2	5	0	0	0	0	0	0
California.....	17	18	8	55	144	90	0	0	0	2	2	3
Total.....	311	154	154	823	1,140	964	2	3	7	101	129	146
27 weeks.....	2,167	1,425	1,290	82,937	129,055	93,132	256	248	577	1,687	1,871	2,253

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 1; South Carolina 1; Georgia 2; Florida 1; Texas 4; New Mexico 1; California 1.

Telegraphic morbidity reports from State health officers for the week ended July 6, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended July 6, 1946							
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tula- remia	Ty- phus fever en- demic	Un- du- lant fever
	July 6, 1946	July 7, 1945		Ame- bic	Bacil- lary	Un- speci- fied					
NEW ENGLAND											
Maine.....	5	31	25	—	—	—	—	—	—	—	—
New Hampshire.....	—	—	—	—	—	—	—	—	—	—	—
Vermont.....	14	28	28	—	—	1	—	—	—	—	2
Massachusetts.....	82	100	100	—	—	3	—	—	—	—	1
Rhode Island.....	13	7	18	—	—	—	—	—	—	—	—
Connecticut.....	19	30	30	1	—	—	—	—	—	—	—
MIDDLE ATLANTIC											
New York.....	135	284	247	2	4	—	1	—	—	—	7
New Jersey.....	70	185	180	—	—	1	—	—	—	—	—
Pennsylvania.....	95	196	199	2	—	—	—	—	—	—	—
EAST NORTH CENTRAL											
Ohio.....	71	155	198	—	—	—	—	1	—	—	—
Indiana.....	23	27	27	—	—	—	—	—	2	—	5
Illinois.....	106	57	73	4	—	—	—	1	2	—	8
Michigan <sup>1</sup> .....	65	35	167	—	—	—	—	—	—	—	2
Wisconsin.....	87	75	103	—	—	—	—	—	1	—	8
WEST NORTH CENTRAL											
Minnesota.....	7	1	41	—	—	—	—	—	—	—	1
Iowa.....	24	8	27	—	—	—	—	—	—	—	18
Missouri.....	14	24	24	—	—	1	1	—	1	—	1
North Dakota.....	—	1	14	—	—	—	—	—	—	—	1
South Dakota.....	—	—	1	—	—	—	—	—	—	—	2
Nebraska.....	5	—	14	—	—	—	—	—	—	—	11
Kansas.....	28	36	70	2	—	—	—	—	—	—	3
SOUTH ATLANTIC											
Delaware.....	—	5	4	—	—	—	—	—	—	—	—
Maryland <sup>1</sup> .....	18	60	84	—	—	—	—	4	—	—	3
District of Columbia.....	8	12	12	—	—	—	—	—	—	—	—
Virginia.....	107	84	84	—	—	95	—	3	1	—	1
West Virginia.....	13	27	94	—	—	6	—	—	—	—	—
North Carolina.....	83	105	144	—	23	—	—	3	—	—	—
South Carolina.....	46	94	94	3	—	—	—	—	—	—	—
Georgia.....	7	9	15	—	1	—	—	—	1	16	3
Florida.....	27	4	8	1	—	—	—	—	—	11	—
EAST SOUTH CENTRAL											
Kentucky.....	33	43	43	—	1	—	—	—	—	—	1
Tennessee.....	34	23	43	1	1	1	1	4	1	1	3
Alabama.....	12	22	39	2	—	—	—	—	—	16	1
Mississippi <sup>1</sup> .....	—	—	—	—	—	—	—	—	1	1	—
WEST SOUTH CENTRAL											
Arkansas.....	15	8	20	3	—	—	—	—	19	1	7
Louisiana.....	16	—	9	—	—	—	—	—	1	5	—
Oklahoma.....	20	26	25	1	—	—	—	6	—	—	1
Texas.....	188	173	250	39	392	20	—	—	—	29	13
MOUNTAIN											
Montana.....	3	4	14	—	—	—	—	—	—	—	—
Idaho.....	3	5	5	—	—	—	1	1	—	—	1
Wyoming.....	6	—	—	—	—	—	—	—	—	—	—
Colorado.....	15	37	33	1	—	—	—	—	1	—	—
New Mexico.....	15	6	8	—	—	—	—	—	—	—	—
Arizona.....	12	29	24	—	—	29	—	—	—	—	—
Utah <sup>1</sup> .....	17	23	31	—	—	—	—	—	—	—	1
Nevada.....	—	—	—	—	—	—	—	—	—	—	—
PACIFIC											
Washington.....	14	21	25	—	—	—	—	—	—	—	3
Oregon.....	22	15	26	—	—	—	—	—	—	—	—
California.....	51	249	222	1	2	—	8	—	—	1	4
Total.....	1,648	2,351	3,431	63	428	163	7	22	32	81	112
Same week, 1945.....	2,351	—	—	50	564	208	5	16	18	100	85
Average, 1943-45.....	2,738	—	—	52	635	334	12	18	18	92	—
37 weeks, 1946.....	50,863	—	—	1,506	9,176	3,422	243	192	508	1,406	2,508
1945.....	67,443	—	—	891	12,248	3,515	185	169	423	1,698	2,510
Average, 1943-45.....	75,603	—	102,038	904	9,597	2,978	263	205	412	1,384	—

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

Leprosy: Texas, 2 cases.

## WEEKLY REPORTS FROM CITIES

City reports for week ended June 29, 1946

This table lists the reports from 84 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	---	0	40	0	3	0	2	0	0	4
New Hampshire:												
Concord.....	0	0	---	0	---	0	0	0	0	0	0	---
Vermont:												
Barre.....	0	0	---	0	1	0	1	0	1	0	0	---
Massachusetts:												
Boston.....	1	0	---	0	154	0	8	0	33	0	2	20
Fall River.....	0	0	---	0	15	0	0	0	0	0	0	2
Springfield.....	0	0	---	0	50	0	0	0	6	0	1	3
Worcester.....	0	0	---	0	168	0	5	0	4	0	0	53
Rhode Island:												
Providence.....	0	0	---	0	81	0	1	0	1	0	1	25
Connecticut:												
Bridgeport.....	0	0	---	0	---	0	1	0	0	0	1	---
Hartford.....	0	0	---	0	2	0	1	0	0	0	0	2
New Haven.....	0	0	---	0	24	0	0	0	3	0	0	---
MIDDLE ATLANTIC												
New York:												
Buffalo.....	2	0	---	0	11	0	2	0	5	0	0	1
New York.....	5	1	4	1	347	4	36	9	67	0	5	27
Rochester.....	0	0	---	0	34	0	2	0	14	0	0	2
Syracuse.....	0	0	---	0	---	0	0	1	2	0	0	1
New Jersey:												
Camden.....	0	0	---	0	1	0	1	0	2	0	0	---
Newark.....	0	0	---	0	38	1	3	1	14	0	0	15
Trenton.....	0	0	1	0	33	0	2	0	1	0	0	5
Pennsylvania:												
Philadelphia.....	3	0	2	2	52	1	12	0	27	0	0	12
Pittsburgh.....	0	0	---	0	16	4	0	0	9	0	0	14
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	2	0	---	0	9	1	2	0	4	0	0	3
Cleveland.....	0	0	1	1	251	2	2	4	9	0	0	15
Columbus.....	1	0	---	0	5	0	0	0	2	0	0	---
Indiana:												
Fort Wayne.....	0	0	---	0	2	0	2	0	1	0	0	1
Indianapolis.....	0	0	---	0	7	0	3	1	4	0	0	7
Terre Haute.....	0	0	---	0	13	0	1	0	0	0	0	---
Illinois:												
Chicago.....	0	0	---	0	52	2	18	2	39	0	1	38
Springfield.....	0	0	---	0	---	0	0	0	0	0	2	---
Michigan:												
Detroit.....	0	1	1	0	26	1	8	1	22	0	0	45
Flint.....	0	0	---	0	---	0	3	0	1	0	0	1
Grand Rapids.....	0	0	---	0	20	0	2	0	2	0	1	8
Wisconsin:												
Kenosha.....	0	0	---	0	33	0	0	0	0	0	0	1
Milwaukee.....	0	0	---	0	84	0	4	0	8	0	0	74
Racine.....	1	0	---	0	137	0	0	1	1	0	0	---
Superior.....	0	0	---	0	3	0	0	0	1	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	---	0	2	1	0	0	1	0	0	3
Minneapolis.....	0	0	---	0	5	0	0	7	4	0	0	---
Missouri:												
Kansas City.....	1	0	---	1	2	0	6	1	2	0	0	14
St. Joseph.....	0	0	---	0	---	0	0	0	0	0	0	---
St. Louis.....	1	1	1	1	39	0	7	0	3	0	2	---



## City reports for week ended June 29, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0	-----	0	12	1	5	0	1	0	0	-----
Kansas:												
Topeka.....	0	0	-----	0	2	0	0	0	2	0	0	3
Wichita.....	0	0	-----	0	7	0	0	0	1	0	0	1
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	2	0	3	0	1	0	0	-----
Maryland:												
Baltimore.....	6	0	-----	0	260	0	7	0	9	0	0	20
Cumberland.....	0	0	-----	0	-----	0	1	0	4	0	0	-----
Frederick.....	0	0	-----	0	1	0	1	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0	-----	0	64	0	7	0	4	0	0	13
Virginia:												
Lynchburg.....	0	0	-----	0	4	0	0	0	0	0	1	-----
Richmond.....	0	0	-----	0	30	0	0	0	0	0	0	11
Roanoke.....	0	0	-----	0	2	0	0	0	1	0	0	3
West Virginia:												
Charleston.....	0	0	-----	0	5	0	0	0	2	0	0	-----
Wheeling.....	0	0	-----	0	-----	0	0	0	1	0	0	10
North Carolina:												
Raleigh.....	0	0	-----	0	-----	0	0	1	0	0	0	4
Winston-Salem.....	0	0	-----	0	15	0	2	0	0	0	0	15
South Carolina:												
Charleston.....	1	0	8	0	-----	0	0	0	2	0	0	-----
Georgia:												
Atlanta.....	0	0	1	1	9	0	1	1	1	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Savannah.....	0	0	-----	0	2	0	1	0	0	0	0	1
Florida:												
Tampa.....	0	0	-----	0	1	1	1	4	1	0	0	4
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	-----	0	5	0	8	1	0	0	0	2
Nashville.....	0	0	-----	0	1	0	0	2	0	0	0	1
Alabama:												
Birmingham.....	1	0	1	0	3	0	3	0	0	0	1	1
Mobile.....	0	0	1	0	1	1	0	1	0	0	2	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	2	0	0	3	0	0	0	1
Louisiana:												
New Orleans.....	0	0	1	0	16	0	7	*1	0	0	1	-----
Shreveport.....	0	0	-----	0	-----	0	0	0	0	0	1	-----
Texas:												
Dallas.....	0	0	-----	0	2	0	2	7	2	0	0	2
Galveston.....	0	0	-----	0	1	0	1	0	0	0	0	2
Houston.....	0	0	-----	0	3	0	4	0	0	0	0	-----
San Antonio.....	2	0	-----	1	-----	0	1	5	0	0	0	1
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	9	0	1	0	0	0	0	-----
Great Falls.....	0	0	-----	0	4	0	0	0	0	0	0	-----
Helena.....	0	0	-----	0	1	0	0	0	0	0	0	-----
Missoula.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	-----	0	0	0	0	0	2	-----
Colorado:												
Denver.....	4	0	-----	0	25	0	5	12	7	0	0	14
Pueblo.....	0	0	-----	0	46	0	0	0	3	0	0	2
Utah:												
Salt Lake City.....	1	0	-----	0	29	0	0	2	3	0	0	-----

\*Exclusive of 11 imported cases.

## City reports for week ended June 29, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polio-myelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	24	1	2	1	8	0	0	4
Spokane.....	0	0	-----	0	3	0	1	0	0	0	0	6
Tacoma.....	0	0	-----	0	1	0	0	0	1	0	0	1
California:												
Sacramento.....	2	0	-----	0	1	0	2	0	1	0	0	-----
San Francisco.....	0	0	-----	0	25	0	4	3	6	0	0	1
Total.....	35	3	21	8	2,375	21	207	72	355	0	24	523
Corresponding week, 1945.	34	-----	12	11	1,334	-----	250	-----	480	0	15	721
Average, 1941-45.....	47	-----	23	19	2,215	-----	1,248	-----	494	1	19	945

<sup>1</sup> 3-year average, 1943-45.<sup>2</sup> 5-year median, 1941-45.*Dysentery, amebic.*—Cases: New York 3; Chicago 3; Baltimore 1.*Dysentery, bacillary.*—Cases: New York 1; Charleston, S. C., 2; Memphis 1.*Dysentery, unspecified.*—Cases: San Antonio 9.*Rocky Mountain spotted fever.*—Cases: St. Louis 1; Frederick 1; Lynchburg 1; Memphis 1.*Tularemia.*—Cases: Memphis 1; Mobile 2.*Typhus fever, endemic.*—Cases: New York 1; Savannah 1; Nashville 1; New Orleans 1; Houston 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 84 cities in the preceding table (estimated population, 1943, 32,123,700)

	Diphtheria case rates	Etiophalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polymyellitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	2.6	0.0	0.0	0.0	1,398	0.0	52.3	0.0	131	0.0	13.1	285
Middle Atlantic.....	4.7	0.5	3.3	1.4	248	4.7	27.1	5.1	66	0.0	2.3	36
East North Central.....	2.5	0.6	1.2	0.6	395	2.7	27.7	5.5	53	0.0	2.5	120
West North Central.....	4.5	2.3	0.0	4.5	155	4.5	40.8	18.0	29	0.0	4.4	52
South Atlantic.....	11.6	0.0	14.9	1.7	656	1.7	38.8	10.0	43	0.0	1.4	134
South Central.....	11.8	0.0	11.8	0.0	69	5.8	64.9	23.8	6	0.0	17.7	24
West South Central.....	5.7	0.0	2.9	2.9	69	0.0	43.0	45.9	6	0.0	5.7	17
Mountain.....	39.7	0.0	0.0	0.0	905	0.0	55.6	111.2	103	0.0	15.9	127
Pacific.....	6.5	0.0	0.0	0.0	170	3.3	29.4	13.1	52	0.0	0.0	39
Total.....	5.7	0.5	3.4	1.3	387	3.4	33.7	11.7	58	0.0	3.9	85

## PLAGUE INFECTION IN SAN BENITO, SAN LUIS OBISPO, AND VENTURA COUNTIES, CALIF.

Under dates of June 24 and July 2, plague infection was reported in California as follows:

## SAN BENITO COUNTY

In a pool of tissue from 5 ground squirrels, *C. beecheyi*, collected May 28 on a ranch 5 miles east of Tres Pinos; in tissue from 11 ground squirrels, *C. beecheyi*, taken May 30 from a ranch 7 miles east of

Tres Pinos, and tissue from 11 ground squirrels, same species, taken on May 31 from the same ranch.

#### SAN LUIS OBISPO COUNTY

In a pool of 224 fleas from 11 ground squirrels, *C. beecheyi*, received at the laboratory on May 10 from the Dixon ranch east of Pozo, San Luis Obispo County, Calif., and proved positive June 18, 1946; in a pool of 387 fleas from burrows 4 miles south and 1 mile east of Atascadero; in pools of 400 fleas from 76 ground squirrels, *C. beecheyi*, and 200 fleas from burrows, 3 miles west of Santa Margarita.

These specimens were received at the laboratory May 29, 1946, and proved positive June 27, 1946.

#### VENTURA COUNTY

In a pool of 4 fleas from 8 harvest mice, *Reithrodontomys megalotis*, collected April 10 from a ranch 1 mile south and 2 miles east of Santa Paula, and a pool of 58 fleas from 1 ground squirrel, *C. beecheyi*, taken on April 16 from a ranch ½ mile south and 1 mile east of Santa Paula.

#### TERRITORIES AND POSSESSIONS

##### Hawaii Territory

*Plague (rodent).*—Tissue from 1 rat found dead on May 10, 1946, in District 7A, Honokaa area, Hamakua District, Island of Hawaii, T. H., was proved positive for plague on May 17, 1946.

##### Panama Canal Zone

*Notifiable diseases—May 1946.*—During the month of May 1946, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	3		2		1		2		8	
Diphtheria	6	1	1				3		10	1
Dysentery:										
Amoebic	1		1		6		1		9	
Bacillary					4		1		5	
Leprosy				1						1
Malaria <sup>1</sup>	7		1	1	15		33	2	56	3
Measles	4				20		3		27	
Meningitis, meningo-										
coccus							1		1	
Mumps	2						1		3	
Paratyphoid fever	1						1		1	
Pneumonia		4		3	31			2	31	9
Tuberculosis		19		6	1	2		6	1	33
Typhoid fever	1								1	
Typhus fever							1		1	

<sup>1</sup> 10 recurrent cases.

<sup>2</sup> In the Canal Zone only.

## Puerto Rico

*Notifiable diseases—4 weeks ended June 15, 1946.*—During the 4 weeks ended June 15, 1946, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox.....	54	Syphilis.....	163
Diphtheria.....	51	Tetanus.....	16
Dysentery, unspecified.....	14	Tetanus, infantile.....	1
Gonorrhea.....	180	Tuberculosis (all forms).....	622
Influenza.....	57	Typhoid and paratyphoid fever.....	34
Malaria.....	316	Typhus fever (murine).....	11
Measles.....	29	Whooping cough.....	170
Poliomyelitis.....	5		

# FOREIGN REPORTS

## CANADA

*Provinces—Communicable diseases—Week ended June 8, 1946.*—During the week ended June 8, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....	-----	31	-----	157	311	36	38	36	85	694
Diphtheria.....	-----	3	-----	25	5	2	1	1	-----	37
Dysentery, unspecified.....	-----	-----	-----	-----	2	-----	-----	-----	-----	2
German measles.....	-----	11	-----	27	13	-----	2	18	10	81
Influenza.....	-----	4	-----	-----	1	-----	-----	-----	1	6
Measles.....	-----	88	18	479	548	129	73	338	168	1,839
Mumps.....	-----	1	-----	43	373	73	35	64	183	772
Polymyositis.....	1	2	-----	-----	-----	-----	-----	-----	1	4
Scarlet fever.....	-----	3	3	88	56	14	3	13	13	188
Tuberculosis (all forms).....	-----	11	12	115	55	17	24	28	68	330
Typhoid and paratyphoid fever.....	-----	-----	1	6	4	-----	1	-----	5	17
Undulant fever.....	-----	-----	-----	2	4	-----	-----	-----	2	8
Veneral diseases:	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Gonorrhea.....	-----	22	15	86	114	37	61	54	111	500
Syphilis.....	-----	23	5	86	87	14	24	6	31	276
Whooping cough.....	-----	9	-----	40	98	2	1	10	-----	160

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

### CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January— April 1946	May 1946	June 1946—week ended—				
			1	8	15	22	29
ASIA							
Burma.....	C	422	151	19			
Bassein.....	C	9	2				
Moulmein.....	C	37	4				
Rangoon.....	C	3	1				
Ceylon.....	C	3				9	
China:		28	1				
Fukien Province.....	C	1					
Hunan Province.....	C	1					
Hupeh Province.....	C	194	11				
Kiangsi Province.....	C	137	69	85			
Kwangtung Province.....	C	610	48				
Canton.....	C	509	30				
India.....	C	22,580	18,340	4,110	2,022	28	
Calcutta.....	C	1,089	295		48		
Chittagong.....	C	3	4				
Madras.....	C	2	1				

## CHOLERA—Continued

Place	January— April 1946	May 1946	June 1946—week ended—				
			1	8	15	22	29
Indochina (French): Cochinchina.....	513	265					
Bien Hoa.....	24						
Chaudok.....	21						
Mytho.....	126	16					
Saigon-Cholon.....	14	1					
Vinh-long.....	7						
Malay States.....				7	2		13
Straits Settlements: Singapore.....	11						
Thailand (Siam).....	1,375	238	198				
Bangkok.....	337	18	9				

<sup>1</sup> Imported.

## PLAGUE

[C indicates cases; P, present]

AFRICA							
Algeria.....	C	2					
Bechuanaland.....	C	10					
Belgian Congo.....	C	2	2				
British East Africa:							
Kenya.....	C	13	5	2	1		
Uganda.....	C	8	4				
Egypt.....	C	52	41	9	12	13	14
Alexandria.....	C	28	25	4	8	11	12
Ismailiya.....	C	16	4				
Port Said.....	C	1				1	1
Suez.....	C	7	12	5	4	1	1
Madagascar.....	C	126	2				
Union of South Africa.....	C	1					
ASIA							
Burma.....	C	498	150	10			
Bassein.....	C	14	1		1		
Rangoon.....	C	99	10	2		5	
China:							
Chekiang Province.....	C	134	6				
Fukien Province.....	C	1,015	197				
Foochow.....	C	383	87				
Kiangsi Province.....	C	66					
Kwangtung Province.....	C	212					
Yunnan Province.....	C	26					
India.....	C	11,052	663	153	84		
Indochina (French): Cochinchina.....	C		1				
Japan: Formosa.....	C						13
Java.....	C	16					
Manchuria.....	C	52					
Mukden.....	C	39					
Palestine.....	C	13				2	
Thailand (Siam).....	C	16					
EUROPE							
Great Britain: Malta.....	C	2			1	3	
Portugal: Azores.....	C	13					
SOUTH AMERICA							
Bolivia:							
Santa Cruz Department.....	C	12					
Tarija Department—Plague-infected rats.....	P						
Ecuador: Loja Province.....	C	6					
Peru:							
Lambayeque Department.....	C	8	3				
Lima Department.....	C	19					
OCEANIA							
Hawaii Territory: Plague-infected rats.....		4	1				

<sup>1</sup> Imported from the China coast.   <sup>2</sup> Pneumonic.   <sup>3</sup> Includes 2 cases of pneumonic plague.<sup>4</sup> Plague infection was also proved positive in Hawaii Territory on Feb. 5, 1946, in a pool of 29 rats, and on Apr. 13, 1946, in a pool of 54 fleas and 15 lice collected from 7 rats and 22 mice.

## SMALLPOX

[C indicates cases; P, present]

Place		January April 1946	May 1946	June 1946—week ended—						
				1	8	15	22	29		
AFRICA										
Algeria.....	C	13								
Basutoland.....	C	6	2							
Belgian Congo.....	C	1 711	1 141	1 36	1 63					
British East Africa:										
Kenya.....	C	371	88	21	12					
Nyasaland.....	C	135	43	27	4			17		
Tanganyika.....	C	1, 666								
Uganda.....	C	289	146							
Cameroon (French).....	C	59	3							
Dahomey.....	C	949	161							
Egypt.....	C	166	77							
Eritrea.....	C		12							
French Equatorial Africa.....	C	128	26							
French Guinea.....	C	542	32							
French West Africa: Dakar District.....	C	36	2							
Gambia.....	C	2	4	1						
Gold Coast.....	C	707								
Ivory Coast.....	C	500	242							
Libya.....	C	47	5	1	6	1				
Mauritania.....	C	1								
Morocco (French).....	C	1, 535	203		2 34					
Morocco (Int. Zone).....	C	165	10							
Nigeria.....	C	3, 830								
Niger Territory.....	C	325	73							
Rhodesia:										
Northern.....	C	228	5							
Southern.....	C	1								
Senegal.....	C	68	26							
Sierra Leone.....	C	286								
Sudan (Anglo-Egyptian).....	C	25	7		1	3				
Sudan (French).....	C	1, 714	123							
Togo (French).....	C	101	39							
Tunisia.....	C	30	3							
Union of South Africa.....	C	102	P	P						
ASIA										
Arabia.....	C	1								
Burma.....	C	934	360	59						
Ceylon.....	C	342								
China.....	C	439	116							
India.....	C	40, 875	7, 228	1, 185	372					
Indochina (French):										
Cochinchina.....	C	105	6							
Laos.....	C	9								
Iran.....	C	24								
Iraq.....	C	5								
Japan.....	C	495								
Malay States.....	C		5	128	74	55	39			
Palestine.....	C	2								
Rhodes (Island of).....	C		1							
Straits Settlements.....	C	1		4	7	5	5			
Syria and Lebanon.....	C	7	1							
Thailand (Siam).....	C	8, 053	771							
Turkey (See Turkey in Europe).										
EUROPE										
Czechoslovakia.....	C	24								
France.....	C	13	1							
Germany.....	C		1							
Gibraltar.....	C	2	1							
Great Britain:										
England and Wales.....	C	2 33	2 14		3	2				
Scotland.....	C	2								
Greece.....	C	113	1							
Italy.....	C	335								
Portugal.....	C	19	3	1						
Spain.....	C		4							
Turkey.....	C	11		5						

1 Includes alastrim.

2 For the period June 1-10, 1946.

3 Includes 1 imported case.

4 Imported.

5 Includes imported cases.

## SMALLPOX—Continued

Place	January-April 1946	May 1946	June 1946—week ended—				
			1	8	15	22	29
NORTH AMERICA							
Canada.....	O 2						
Guatemala.....	O 55						
Honduras.....	O 3						
Mexico.....	O 218	78					
SOUTH AMERICA							
Argentina.....	O 62						
Bolivia.....	O 229						
Brazil.....	O 113	2					
Colombia.....	O 436	55					
Ecuador.....	O 9	30					
Peru.....	O 109						
Uruguay.....	O 11						
Venezuela.....	O 1482	116		84			
OCEANIA							
Hawaii Territory.....	O 1						

1 Includes alastrim.

2 For the period June 1-10, 1946.

3 Off-shipping.

## TYPHUS FEVER\*

[O indicates cases; P, present]

<b>AFRICA</b>							
Algeria.....	O 21						
Basutoland.....	O 3						
Belgian Congo 1.....	O 1,564	244	37	103			
British East Africa: Kenya 1.....	O 14	6					
Egypt.....	O 986	53					
Eritrea.....	O 266	22	26	20			
Libya.....	O 29	26	5	2	4		
Morocco (French).....	O 2,312	619		199			
Morocco (Int. Zone).....	O 46	6					
Morocco (Spanish).....	O 1						
Nigeria.....	O 26						
Rhodesia, Northern.....	O 1						
Sierra Leone 1.....	O 3						
Tunisia 1.....	O 177	6					
Union of South Africa 1.....	O 98	P	P				
<b>ASIA</b>							
Arabia 2.....	O 1						
China.....	O 24	8	1				
India.....	O 262						
Indochina (French).....	O 2						
Iran.....	O 115						
Iraq.....	O 77	87	7		5		
Japan.....	O 128						
Malay States.....	O		3				
Palestine 1.....	O 23	6		2			
Straits Settlements.....	O 1				5		
Syria and Lebanon.....	O 61	14		2			
Trans-Jordan.....	O 14			1	2		
Turkey (See Turkey in Europe).....	O						
<b>EUROPE</b>							
Albania.....	O 53						
Austria.....	O 30						
Belgium.....	O	1					
Bulgaria.....	O 598	158	21				
Czechoslovakia 1.....	O 608	117	31				
France 1.....	O 11	1					
Germany.....	O 1,794	11					
Great Britain:							
England and Wales.....	O	1					
Malta 2.....	O 8						
Greece 1.....	O 204	29	11		13		

\*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

For footnotes, see page 1130.



## TYPHUS FEVER—Continued

Place		January— April 1946	May 1946	June 1946—week ended—				
				1	8	15	22	29
Hungary.....	C	477	138	19	—	—	—	—
Italy.....	C	6	—	—	—	—	—	—
Netherlands.....	C	15	—	—	—	—	—	—
Poland.....	C	2,014	419	71	22	—	—	—
Portugal.....	C	2	1	—	—	—	—	—
Rumania.....	C	4,766	1,286	—	—	—	—	—
Spain.....	C	2	3	—	—	—	—	—
Sweden <sup>1</sup> .....	C	—	1	—	—	—	—	—
Turkey.....	C	835	137	23	9	20	31	—
Yugoslavia.....	C	2,219	—	—	—	—	—	—
NORTH AMERICA								
Costa Rica <sup>1</sup> .....	C	34	7	—	3	4	—	—
Cuba <sup>1</sup> .....	C	4	—	—	—	1	—	—
Guatemala.....	C	308	—	—	—	—	—	—
Jamaica <sup>1</sup> .....	C	13	1	2	—	—	—	—
Mexico.....	C	465	124	—	—	—	—	—
Panama (Republic).....	C	1	1	—	—	—	—	—
Puerto Rico <sup>1</sup> .....	C	19	16	5	4	—	—	—
Virgin Islands <sup>1</sup> .....	C	1	—	—	—	—	—	—
SOUTH AMERICA								
Argentina.....	C	2	—	—	—	—	—	—
Bolivia.....	C	67	—	—	—	—	—	—
Chile.....	C	97	—	—	—	—	—	—
Colombia.....	C	117	—	—	—	—	—	—
Ecuador <sup>1</sup> .....	C	344	65	—	—	—	—	—
Paraguay.....	C	1	—	—	—	—	—	—
Peru.....	C	290	—	—	—	—	—	—
Venezuela <sup>1</sup> .....	C	44	15	—	—	—	—	—
OCEANIA								
Australia <sup>1</sup> .....	C	66	10	—	—	—	—	—
Hawaii Territory <sup>1</sup> .....	C	17	1	—	1	—	1	—

<sup>1</sup> Includes cases of murine type.<sup>2</sup> For the period June 1-10, 1946.<sup>3</sup> Murine type.

## YELLOW FEVER

[C indicates cases; D, deaths]

AFRICA								
Nigeria:								
Ibadan.....	C	1	—	—	—	—	—	—
Ogbomosho.....	C	—	25	—	—	—	33	6
Sierra Leone: Fajeha.....	C	—	—	—	—	1	—	—
SOUTH AMERICA								
Bolivia: Santa Cruz Department.....	D	40	—	—	—	—	—	—
Brazil: Para State.....	D	1	—	—	—	—	—	—
Colombia:								
Caqueta Territory.....	D	1	—	—	—	—	—	—
Magdalena Department.....	D	1	—	—	—	—	—	—
Santander Department.....	D	1	—	—	—	—	—	—
Venezuela:								
Tachira State.....	C	4	—	—	—	—	—	—
Trujillo State.....	C	4	—	—	—	—	—	—
Zulia State.....	C	4	—	—	—	—	—	—

<sup>1</sup> Includes 24 cases of suspected yellow fever.<sup>2</sup> For the period June 11-20, 1946.<sup>3</sup> 14 of these deaths have been confirmed.

FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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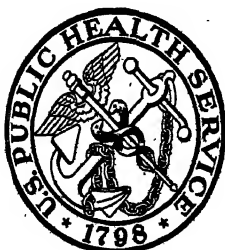
**NUMBER 31**

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**TUBERCULOSIS CONTROL ISSUE NO. 6**

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## EDITORIAL

### NEED FOR HOSPITAL FACILITIES FOR THE TUBERCULOUS

In the United States during the year 1944, 36 percent of all deaths from respiratory tuberculosis occurred outside of hospitals and institutions. This means that 19,703 persons were not given adequate medical care during their prolonged illness. In spite of the advances that we have made in the United States in the control of tuberculosis, we still are seriously weak in providing hospitals for the tuberculous. It is obvious that we cannot eradicate tuberculosis in the population of the United States if we do not isolate infectious cases and treat and rehabilitate the cases that are found. The day has gone by when we could leave the treatment of tuberculosis to the discretion of local dominion. There are many areas in the country which unassisted cannot afford to provide adequate hospital care for their populations. Nine populous States throughout the southern part of the United States have 55 to 77 percent of deaths occurring outside of hospitals and institutions. Such facts demonstrate forcibly the need for a more realistic distribution of hospital facilities so that tuberculosis, a disease that recognizes no such artificial boundaries as State lines, can be forcibly checked equally throughout the Nation.

The total of all estimated bed deficiencies is 44,388. That the seriousness of this situation is realized by the people of the United States is demonstrated by a bill (S. 191) which is designed to amend the Public Health Service Act, to authorize grants to the States, and to assist the States in planning the construction of additional hospital facilities, including beds for the tuberculous. Hearings on this bill make it plain that the United States is in serious need of extensive hospital construction, particularly in areas in which such facilities are either inadequate or absent. The welfare of the

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people depends in a large part on the health of the people. The health of the people depends in a large part on the availability of medical services and hospitalization. The effectiveness of hospitalization and medical care depends upon the willingness of the people and their State governments to cooperate in a program that will insure the construction and maintenance of adequate facilities.

In the field of tuberculosis control, great stress has been laid on case finding as one step in eradication. However, the value of case finding must be measured by the number of discovered cases that are given hospital care. It will do us little good to know the extent of the tuberculosis problem in the United States if we do not implement that knowledge with modern medical therapy. Indeed, it may be said that the years of labor and the millions of dollars that have been spent to control tuberculosis will largely go to waste if the present maldistribution of tuberculosis hospitals remains an unsolved problem.

## SOME EPIDEMIOLOGICAL ASPECTS OF SENSITIVITY TO HISTOPLASMIN AND TUBERCULIN<sup>1</sup>

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During the past year several reports (1), (2) have shown that there is a close relationship between sensitivity to histoplasmin and pulmonary calcification. Christie and Peterson (1), in addition to reporting details of this relationship, studied the age factor in sensitivity to histoplasmin, tuberculin, and pulmonary calcification among 181 children in middle Tennessee. Emmons et al. (3) reported on the histoplasmin sensitivity by age and sex among 136 adult patients in St. Elizabeths Hospital, Washington, D. C. Palmer (4) in a study of approximately 10,000 student nurses in widely separated areas in the United States reported on the geographic variations in histoplasmin sensitivity. Except for these preliminary studies, little information has been available concerning the major epidemiological characteristics of histoplasmin sensitivity and of its relationship to pulmonary calcification. Early in 1945, therefore, an extensive study was begun in Kansas City, Mo., to determine the significance of age, race, sex, residence, socioeconomic, familial, and other basic factors in the epidemiology of sensitivity to histoplasmin. The present paper is the first report from this study.

### Material and Methods

Through the cooperation of the Board of Education, the City Health Department, and the Tuberculosis Society of Kansas City, Mo., histoplasmin and tuberculin skin tests and chest X-rays were

<sup>1</sup> From the Field Studies Section, Tuberculosis Control Division.

made on over 17,000 persons. The greater part of the group was made up of white and Negro children attending the public schools. Approximately one-fourth of the total school population—those attending 33 grade schools, 7 high schools, and a junior college—was studied. In addition, 482 preschool children attending the summer nursery schools conducted by the Board of Education were included. The 41 schools selected for study were widely distributed over the city, and included schools in areas of poor and good economic circumstances, of semi-rural and urban habitation, with high and low tuberculin rates. Generally, grade and high schools in the same neighborhood were selected, so as to obtain a maximum number of children in family groups.

Written parental consent was obtained for the tests and X-ray on a form which also requested information as to age, birthplace, and all places of residence during the life of the child. The schools varied in the percentage of parental consent obtained, from 27 to 94 percent, with an average of 64. The number of children tested in the various schools ranged from 18 to 1,289. A total of 16,013 children, 13,522 white and 2,491 Negro, were skin-tested. Somewhat fewer were X-rayed.

In addition to the school children, more than 1,200 adults were tested and X-rayed. Residence histories of these adults were also obtained. Of these adults three-fourths were employees of the city government and the remainder were employees of the Federal Government stationed in Kansas City. While this group cannot be considered representative of the adult population of Kansas City, they may be employed to obtain a preliminary and tentative conception of the epidemiological characteristics of the adult population. One of the major factors that reduces the representativeness of this group is that many of the males were engaged in outdoor work, whereas most of the females were employed in clerical and office work.

A few of the school children were studied in May 1945, the nursery school group during the summer months of 1945, most of the school children between October and December 1945, and the adults during the early months of 1946.

Since all studies of histoplasmin sensitivity indicate widespread geographical differences, the previous places of residence of the population studied must be considered (4). For the purposes of the present paper all children were classified as "lifetime residents" of Kansas City if they had never resided away from the city or its environs for longer than 6 months at any one time. All other children were considered as "nonlifetime residents." As will be discussed elsewhere, somewhat different criteria for residence were applied to the adults.

The tuberculin employed was Purified Protein Derivative (PPD-S), furnished by Dr. Florence B. Seibert of the Henry Phipps Institute



of Philadelphia, Pa. A single dose of 0.0001 mg. in 0.1 cc. of diluent was administered intracutaneously (5). The histoplasmin ( $H_3$ ) (3) was furnished by Dr. Chester Emmons of the National Institute of Health. It was used in a dilution of 1 to 1,000, and 0.1 cc. was injected intracutaneously. For both skin tests, a reaction was considered positive if the induration measured 5 or more millimeters in diameter at the 48-hour reading. All of the skin tests were given by one of three persons, and all the readings were made by one of two persons.

Chest X-rays were obtained on 14" x 17" or 11" x 14" film and interpreted without knowledge of the tuberculin or histoplasmin reactions. Pulmonary calcification, as noted in the present study, was classified into three groups: namely, definite, probable, and questionable. The "definite" category included calcification in which the size, density, sharpness, and irregularity of outline were so striking as to be unquestionable. Calcification designated as "probable" represented shadows not as definite as in the preceding group, but in which the density and configuration seemed to exclude vascular structures and calcifying costal cartilages. The "questionable" group embraced all densities which could conceivably represent calcification but of which the interpreter was doubtful. In the analysis reported in this paper, films showing only questionable calcification were included among those classified as negative for calcification. Although X-ray films were obtained on nearly all of the persons tested, there was considerable variation in the diagnostic quality of the films. In order to obtain an estimate of the frequency of calcification as accurately as possible, only those films considered as quite satisfactory for interpretation of calcification were used in the present analysis.

### Results

A general summary of the results of the histoplasmin and tuberculin tests on the school children is shown in table 1.

Figure 1 shows the percentage positive to histoplasmin and to tuberculin by age, sex, and race among almost 16,000 school children. The lowest two curves in figure 1 illustrate the change with age in the frequency of positive reactions to tuberculin among male and female white school children. Although the rates on preschool children are not based on large numbers, they are seen to be low, reaching about 2 percent by the age of 6 years. Throughout the school years there is a slow steady rise to a rate of a little over 10 percent by the age of 18 years. There is little indication of a sex difference. The next higher pair of curves in figure 1 is for tuberculin reactors for male and female Negro children; comparison of these curves with those for white children shows that in general the frequency of positive tuberculin reactors is about three times that for white children. At

the time of entrance into school, the percent of reactors approximates 6 or 7, while at the end of the school period, at 18 years, the rates are about 30 percent. Again, there seems to be little consistent difference between males and females.

The curves showing the rates for positive histoplasmin reactors are much higher than those for tuberculin. Beginning with about 5 percent positive at age 2, the percentage positive rises steadily to over 60 percent at age 18. Up to age 8 little difference is seen between white and Negro, male and female. After the tenth year the curves for the white children tend to be above those for the Negroes; among the whites, males tend to be 6 to 8 percent higher than females of corresponding age.

It is well known that tuberculosis and positive tuberculin rates are markedly influenced by such socioeconomic factors as poverty and

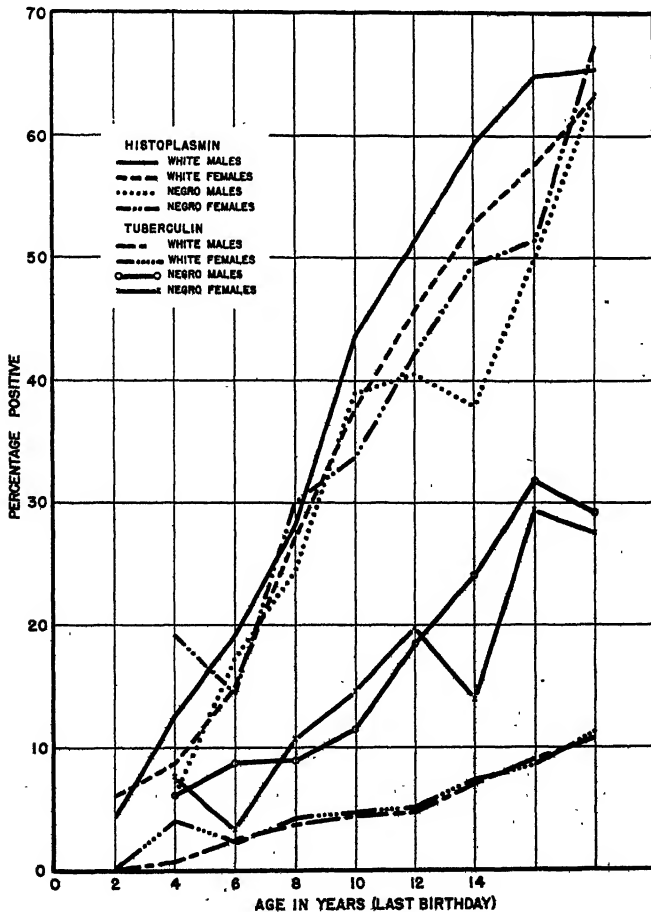


FIGURE 1.—Percentage positive to histoplasmin and to tuberculin by age, sex, and race: Kansas City, Mo., school children tested in 1945. (Rates based on less than 20 children not shown.)

TABLE 1.—Percentage positive to both *histoplasmin* and *tuberculin*, *histoplasmin* alone, or *tuberculin* alone by age, race, residence, and sex among children receiving both tests

[Kansas City, Mo., school children tested in 1945]

Age in years	Lifetime residents						Nonlifetime residents							
	Males			Females			Males			Females				
	Num- ber tested	Percent		Num- ber tested	Percent		Num- ber tested	Percent		Num- ber tested	Percent			
		H+T+	H+T- H-T+		H+T+	H+T- H-T+		H+T+	H+T- H-T+		H+T+	H+T- H-T+		
Total.....	13,522	4,036	2.1	41.3	2.4	4,007	2,034	2.3	46.1	3.1	2,845	2.9	42.4	2.6
Under 1.....	7			14.3		5	9							
1.....	14	32		4.3		29	22		11.1		14		12.5	
2.....	84	47		16.2	1.4	25	32		21.9	4.5	8		15.6	6.3
3.....	102	74		13.8	1.0	61	159		21.4	3.2	32		15.6	1.3
4.....	199	318		19.6	1.6	277	194		25.3	4.6	164		19.8	2.3
5.....	954	306	0.8	21.1	2.9	289	177		23.7	2.9	177		23.9	1.9
6.....	978	304	.4	32.0	4.6	233	165		39.4	1.8	208		31.6	1.9
7.....	941	281	.7	41.1	7	233	194		43.8	1.5	212		34.2	1.6
8.....	938	294	1.4	41.6	3.1	239	228		43.0	4.4	187		34.2	1.6
9.....	998	291	1.1	45.1	2.5	268	228		53.1	1.0	190		43.4	1.1
10.....	944	275	1.1	47.5	3.5	270	180		53.1	1.0	203		43.4	1.1
11.....	926	263	1.6	49.4	3.2	288	200		54.5	1.9	193		49.7	2.0
12.....	1,032	308	3.9	60.1	4.1	322	210		57.7	2.8	236		44.5	3.0
13.....	1,301	398	4.1	60.1	1.5	390	251		63.8	6.1	272		46.3	2.6
14.....	1,326	390	4.1	60.3	1.8	395	245		63.8	6.1	296		46.3	2.9
15.....	1,308	313	4.2	62.9	3.5	364	284		66.4	4.6	267		53.0	5.8
16.....	1,122	174	5.6	62.9	2.4	122	109		81.8	6.3	183		50.6	1.5
17.....	513	124	18.7	37.5	6.3	28	11		81.8	6.3	28		53.6	3.5
18.....	81	16		100.0			4		25.0		10		80.0	
19.....	25	3				8								

WHITE

## NEGRO

Total	2,491	744	4.8	23.5	10.0	822	6.0	25.3	9.0	412	6.3	36.2	7.8	513	6.6	39.0	8.8
Under 1																	
1	2	1				1				2							
2	15	8				2				4							
3	18	11			9.1	13			66.7		25.0			10		50.0	33.3
4	41	14				66				17				20		20.0	5.0
5	173	63	1.4	10.0	2.0	66		6.1	1.5	17	5.0	5.9	5.0	20		20.0	5.0
6	173	63		22.2	12.7	62		14.5	4.9	20	5.0	20.0	5.0	20		20.0	5.0
7	225	70		13.0	12.7	73	2.7	23.3	9.8	36	5.0	38.9	6.6	37		32.0	2.0
8	254	77		16.9	11.7	90	3.3	23.3	8.9	44		34.1		43		42.6	4.0
9	258	90	2.6	33.3	10.0	94	2.1	17.0	12.8	36	2.8	43.6		35		35.7	6.6
10	292	73	2.2	36.1	9.6	106	0.0	28.8	7.0	60	2.3	40.0	6.7	35	5.7	47.4	5.0
11	238	74	5.5	29.7	8.1	70	8.6	28.8	10.0	43	9.3	39.5	9.3	50	5.8	47.3	5.0
12	280	63	6.3	25.4	12.3	66	6.1	33.3	13.6	47	4.3	42.5	6.4	51	7.3	45.6	1.8
13	91	29	7.7	15.4	10.2	23	4.5	50.0	4.5	20	4.3	34.8	21.3	20		45.6	0.0
14	89	18	5.6	33.3	11.1	29	13.8	41.4	10.3	20	10.0	45.0	11.0	22	4.5	36.4	0.0
15	107	28	14.3	35.7	13.0	36	22.2	33.1	13.9	15	10.0	40.0	15.0	23	28.1	36.1	4.1
16	127	23	21.8	30.4	13.0	46	8.7	32.6	13.0	20	11.8	35.8	23.5	41	13.2	38.9	17.1
17	104	22	13.6	50.0	9.1	38	15.8	47.4	5.3	11	27.3	27.3	9.1	33	13.2	35.9	15.1
18	35	4	25.0	50.0		9		55.0	11.1	4	26.0	50.0	25.0	18	22.2	61.1	11.1
19	8					2		50.0		1	100.0			9		60.0	

overcrowding, especially among Negroes. As shown in this study there are three times as many positive tuberculin reactors among Negroes as among whites of similar age. The finding of this study that Negroes have lower histoplasmin rates than whites of similar age suggests that such socioeconomic factors are not operative in the development of histoplasmin sensitivity.

The histoplasmin rates established for Kansas City by this study are considerably lower than those reported by Christie and Peterson for Tennessee (1). It should be mentioned, however, that these authors used a 1 to 100 dilution of histoplasmin, whereas a 1 to 1,000 dilution was used in Kansas City.

Figure 2 shows the percentage positive to histoplasmin and tuberculin by age, race, and residence. In this figure the curves for positive reactors among lifetime residents of Kansas City are compared to

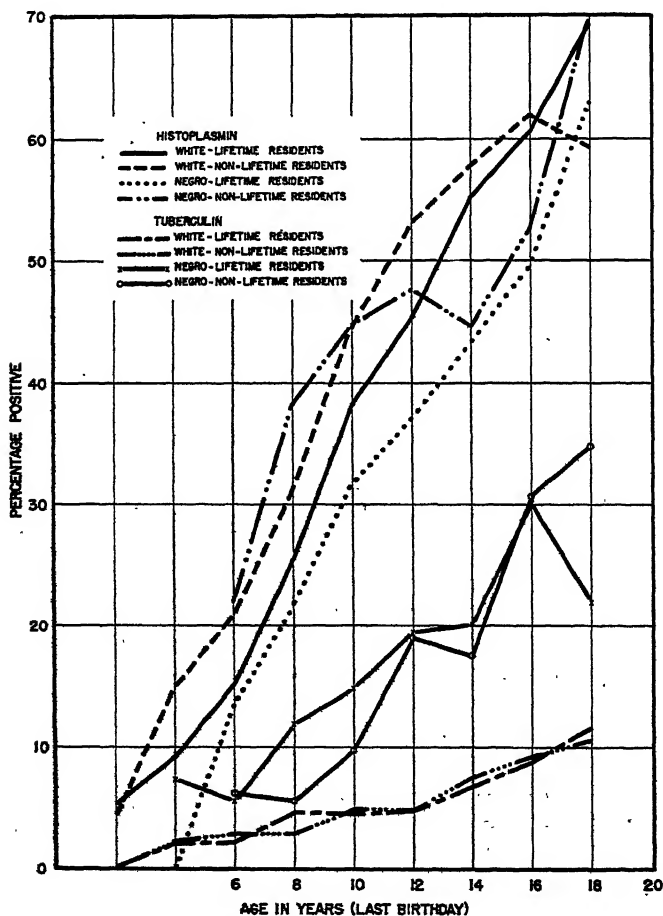


FIGURE 2.—Percentage positive to histoplasmin and to tuberculin by age, race, and residence: Kansas City, Mo., school children tested in 1945. (Rates based on less than 20 children not shown.)

similar curves for the nonlifetime residents. Considering the histoplasmin reactions in both Negro and white children, it is seen that the rates among lifetime residents of Kansas City are lower throughout all the age span than the rates among nonlifetime residents. One possible explanation is that the net effect of migration from areas of high and low sensitivity results in a group whose average sensitivity level is above that for permanent residents. Another is that negative persons migrating to Kansas City become sensitive at a higher rate than permanent residents of similar age and sex.

Little differences between lifetime and nonlifetime residents in tuberculin rates are evident among the white children. Among the Negro children there is a tendency for lifetime residents of Kansas City to have higher rates than nonlifetime residents.

In table 2 are assembled data on the percentage of positive reactors to tuberculin and histoplasmin among the white adult group.

TABLE 2.—*Percentage of positive reactors to histoplasmin and to tuberculin by sex and age groups*  
[Kansas City, Mo., white adults tested in 1946]

Test	Total	Age groups in years								
		20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Histoplasmin: <sup>1</sup>										
Males:										
Number tested.....	610	35	61	80	84	77	78	80	60	55
Percent positive.....	78.5	68.6	78.7	81.2	88.1	83.1	82.1	77.5	71.7	63.6
Females:										
Number tested.....	158	39	12	13	21	14	21	21	11	6
Percent positive.....	53.8	66.7	58.3	53.8	47.6	50.0	57.1	42.9	45.5	33.3
Tuberculin: <sup>2</sup>										
Males:										
Number tested.....	859	54	101	114	139	117	99	99	70	66
Percent positive.....	63.8	31.5	33.7	49.1	58.3	69.2	74.7	89.9	92.9	77.3
Females:										
Number tested.....	384	91	57	42	56	42	41	30	17	8
Percent positive.....	43.0	14.3	31.6	35.7	46.4	54.8	68.3	73.3	76.5	87.5

<sup>1</sup> Lived in Kansas City, Mo., and environs for 15 or more years.

<sup>2</sup> All adults tested regardless of residence history.

Although all adults were given both tests, the table shows that the number of persons on which the tuberculin rates are based is larger than that on which the histoplasmin rates are based. Previous residence did not influence rates of reactors to tuberculin. Accordingly, the rates for tuberculin are based on all adults tested. Study of the histoplasmin reactors, however, showed marked variation in percentage positive associated with past residence. Accordingly, it was arbitrarily decided to present histoplasmin rates only for those who had lived for 15 or more years in Kansas City or its immediate environs.

Data from tables 1 and 2 are combined in figure 3 to give a composite picture, representative insofar as practicable with material now available, of the histoplasmin and tuberculin rates among white

residents of all ages in Kansas City. The histoplasmin reactors in the group up to 20 years of age are based on large numbers of "lifetime residents" as defined above. The histoplasmin rates for those over 20 years of age are based on 768 persons who had lived in Kansas City or its environs for 15 or more years. Since little difference was found in tuberculin reactors among residents and nonresidents tested in Kansas City, the curves shown in this figure are based on all white persons tested.

The percentage positive to tuberculin rises slowly with no sex differences to a level of slightly over 10 percent by the age of 18 years.

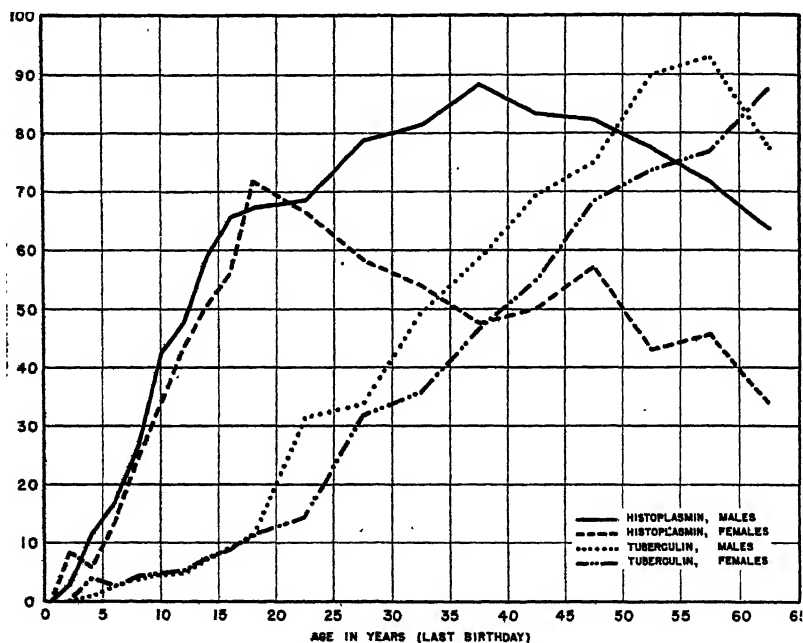


FIGURE 3.—Percentage positive to histoplasmin and to tuberculin by age and sex: Kansas City, Mo., white persons tested in 1945-46. (See text.)

At about age 20 there is an abrupt increase in the slope of the curves which rise quite uniformly, so that by the age of 55 years over 90 percent of the males and 75 percent of the females are found to be positive. Substantial sex differences, averaging 10 to 15 percent, are found in all the older age groups, the males being higher than the females.

The striking rise in histoplasmin rates during the first 20 years of life is clearly brought out in this figure; the fact that white males consistently show a slightly higher percentage of positive reactors is also shown. After the age of 20 marked differences are seen in the percentage of reactors between the sexes. The male rates increase steadily up to the 35-40 year age group where a peak of nearly

90 percent reactors is reached. The rates then decrease to about 65 percent in the age group 60-65. The rates among the females are based on relatively few persons (158) and may not be representative of the adult female population of Kansas City. However, the evidence available seems to indicate a slow decrease in percentage of positive reactors after the age of 20 years. A similar difference in percentage of positive reactors between males and females was noted by Emmons et al. (3).

Results of the study of pulmonary calcification in the school children are shown in table 3. In the total group of 6,528 children, 12.7 percent showed definite or probable pulmonary calcification. Among those positive to both histoplasmin and tuberculin, 23.8 percent showed calcification; among those positive to histoplasmin but nega-

TABLE 3.—*Percentage of children showing pulmonary calcification by reaction to histoplasmin and tuberculin by age groups*<sup>1</sup>

[Kansas City, Mo., white and Negro school children tested in 1945]

Age groups in years	Total		Reaction groups							
			H+T+		H+T-		H-T+		H-T-	
	Number tested	Percent with calcification	Number in group	Percent with calcification	Number in group	Percent with calcification	Number in group	Percent with calcification	Number in group	Percent with calcification
Total.....	6,528	12.7	235	23.8	2,454	26.4	273	11.4	3,566	2.6
4-6.....	978	3.8	3	0.0	165	17.6	32	3.1	778	0.9
7-9.....	1,618	8.9	17	41.2	464	21.6	59	6.8	1,073	3.1
10-12.....	1,714	13.7	49	16.3	699	26.6	71	14.1	895	3.5
13-15.....	1,414	19.0	33	28.9	721	30.2	59	16.9	551	2.9
16-18.....	809	17.8	33	20.5	405	28.6	52	11.5	269	1.9

<sup>1</sup> Based on those X-rays satisfactory for interpretation of pulmonary calcification.

tive to tuberculin, 26.4 percent; and among those negative to histoplasmin but positive to tuberculin, 11.4 percent. In the group of 3,566 children who were negative to histoplasmin and tuberculin only 2.6 percent had calcification. In general, these findings are in agreement with similar data presented by Christie and Peterson (1) and Palmer (2).

Details of the change with age in the frequency of pulmonary calcification are also shown in table 3 and in figure 4. For the total group a steady rise in the percentage of children with calcified lesions is evident with increasing age. The age group 4-6 shows less than 4 percent with calcified lesions, whereas the age group 16-18 shows 18 percent. The finding that the age group 13-15 shows a slightly greater percentage of persons with calcified lesions than the next older age group is in agreement with Christie and Peterson (1) and Gass et al. (6). Preliminary data for older age groups in Kansas City indicates, however, that the percentage of calcified lesions con-



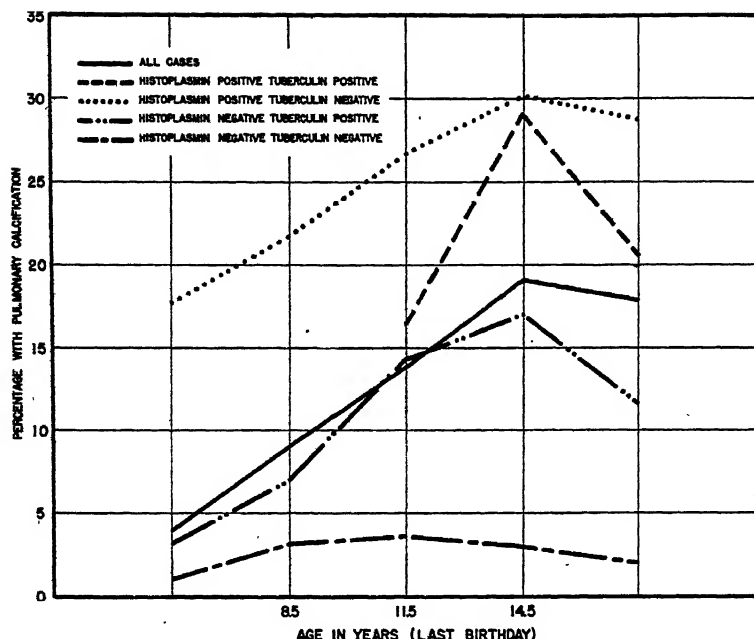


FIGURE 4.—Percentage with calcification by age and by reaction groups to histoplasmin and to tuberculin: Kansas City, Mo., school children tested in 1945. (Rates based on less than 20 children not shown.)

tinues to rise with age in spite of the apparent decrease in the age group 16-18.

The group which is positive to histoplasmin and negative to tuberculin shows a consistent increase with age from 17.6 percent in the youngest group to about 30 percent in the 13-15 year old group. Among those positive to tuberculin and negative to histoplasmin, a still more marked increase with age is evident. The age group 4-6 shows 3.1 percent while the age group 13-15 shows 16.9. Among the group positive to both tuberculin and histoplasmin, considerable variation with age is shown, due perhaps to the relatively small number of cases, especially in the younger age groups. The rates among those negative to both tuberculin and histoplasmin begin with less than 1 percent among the youngest age group and rise slightly to 3.5 percent in the age group 10-12 and decline again to 1.9 percent among the oldest children.

One possible explanation of the increase in pulmonary calcification among positive reactors to either test with increasing age is that there is a time lag between the development of a positive skin reaction and the appearance of calcification. Another is that repeated exposure to the causative agent is necessary before calcification develops, although no evidence is available of such an occurrence in tuberculosis.

### Summary

Histoplasmin and tuberculin skin tests and chest X-rays were made on over 17,000 persons in Kansas City, Mo., to establish the major epidemiological characteristics of histoplasmin sensitivity. The frequency of histoplasmin and tuberculin reactors by age, sex, race, and residence are reported in this first paper from the study. In addition, the frequency of pulmonary calcification by age and skin-test reactions is presented. The preliminary findings are:

1. The percentage of positive histoplasmin reactors among whites is slightly higher than among Negroes, higher among males than females, and higher among nonlifetime residents than lifetime residents.

2. The percentage of positive tuberculin reactors is three times higher among Negroes than whites. Very little difference was observed between males and females, and between lifetime and non-lifetime residents.

3. The frequency of pulmonary calcification is over twice as high among reactors to histoplasmin alone as to tuberculin alone. The frequency of calcification among those who reacted to neither test was very low, equaling 2.6 percent. Among those who reacted to either tuberculin or histoplasmin there is a marked increase with age in the occurrence of calcification.

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## TUBERCULOSIS THROUGHOUT THE WORLD

### I. THE PREWAR DISTRIBUTION OF TUBERCULOSIS THROUGHOUT THE WORLD<sup>1</sup>

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It will be several years before an accurate conception of the devastation from tuberculosis during the war years can be obtained, although it is certain that tuberculosis control will be a major problem in the rehabilitation of the war-torn countries of the globe. Some knowledge of the prewar distribution of the disease throughout the world should be useful as a basis for evaluating the extent of this problem.

The logical measure of the prevalence of tuberculosis is the number of cases occurring during the year per 100,000 population. Unfortunately, very few countries record cases of this disease with any degree of completeness. For this reason the tuberculosis mortality rate is generally regarded as a more useful indication of the prevalence of this disease. In this paper the prewar prevalence is indicated by the tuberculosis mortality rates, and estimated from additional data for countries where the tuberculosis death rate is not known, but for which some data can be obtained. Where possible, crude death rates for 1939 will be used, since the data necessary for adjusted rates are, in general, lacking. Unless otherwise specified, all rates are for deaths from all forms of tuberculosis.

The material is presented in two sections, the first giving the general distribution of tuberculosis throughout the world, and the second presenting in some detail the specific data for the various countries with the source from which the data were obtained. There are, of course, many areas for which no data could be found.

#### General Prevalence of Tuberculosis

Although the tuberculosis death rate, i. e., the number of deaths from all forms of tuberculosis per 100,000 population, is probably the most useful means of evaluating the prevalence of tuberculosis, there is serious underregistration of tuberculosis deaths in many countries, particularly those where medical services are not common, and the collection of vital statistics rudimentary. In such countries the reported tuberculosis death rate has little meaning. A more accurate

<sup>1</sup> From the Tuberculosis Control Division.

conception of conditions can often be obtained from the rates of cities, where the reporting and registration of deaths is more complete than in rural areas, from special studies of limited areas, from data on racial and social groups, and from proportionate mortality.

The data which form the basis for classification of the various countries into the categories used in table 1 range in reliability from

TABLE 1.—*Prevalence of tuberculosis in all countries as estimated from their probable death rates from all forms of tuberculosis*

Country	Tuberculosis death rate	Country	Tuberculosis death rate
Very low prevalence (rates under 50 per 100,000):		Medium prevalence (rates 100-149 per 100,000)—continued	
Denmark.....	34	Greece.....	128
Australia.....	40	Iceland.....	132
Netherlands.....	41	France.....	137
United States.....	47	Bulgaria.....	138
Low prevalence (rates under 100 per 100,000):		Hungary.....	148
Germany.....	50	Portugal.....	148
Egypt.....	52	Probable medium prevalence:	
Canada.....	53	Algeria.....	-----
Tasmania.....	53	Bolivia.....	-----
Mexico.....	56	Dominican Republic.....	-----
Palestine.....	56	Morocco.....	-----
New Zealand.....	60	Nicaragua.....	-----
Ceylon.....	62	Tunisia.....	-----
England and Wales.....	62	Guatemala.....	-----
Luxemburg.....	62	Thailand.....	-----
Hawaii.....	67	High prevalence (rates 150 and over per 100,000):	
Belgium.....	68	Russia.....	180
Scotland.....	70	Estonia.....	161
Sweden.....	75	Formosa.....	161
Cuba.....	76	Rumania.....	162
Italy.....	76	Costa Rica.....	172
Switzerland.....	80	Finland.....	190
Mauritius.....	81	Kwangtung.....	192
Virgin Islands.....	81	Burma.....	193
Northern Ireland.....	84	Poland.....	195
Norway.....	86	Newfoundland and Labrador.....	198
Lithuania.....	86	Turkey.....	198
Jamaica.....	97	Straits Settlements.....	202
Probable low prevalence:		American Samoa.....	206
British Guiana.....	-----	Japan.....	207
Curacao.....	-----	Venezuela.....	233
Columbia.....	-----	Yugoslavia (pulmonary only).....	234
Granada.....	-----	Brazil.....	250
Honduras.....	-----	Puerto Rico.....	257
Iraq.....	-----	Chile.....	264
Surinam.....	-----	India (pulmonary only).....	263
Syria.....	-----	Aden.....	261
Union of South Africa.....	-----	Philippines.....	298
Medium prevalence (rates 100-149 per 100,000):		China.....	400-600
Austria.....	100	Alaska.....	437
Monaco.....	100	Greenland.....	550
Santa Lucia.....	100	Probable high prevalence:	
Trinidad and Tobago.....	101	Ecuador.....	-----
Uruguay.....	101	El Salvador.....	-----
Paraguay.....	102	French Indochina.....	-----
Argentina.....	103	Haiti.....	-----
Latvia.....	108	Java.....	-----
Eire.....	113	Korea.....	-----
Panama.....	119	Peru.....	-----
Spain.....	122	Sumatra and the "Outer Provinces".....	-----
Czechoslovakia.....	124	Western Pacific Islands.....	-----

accurate rates to the author's impressions. The basis for such impressions is presented in some detail for each country so that the validity of the estimates and impressions may be judged.

In order to minimize the errors in such estimates very broad prevalence groups are employed. To present the impressions gained from

the available data in a specific country as a definite rate (therefore seemingly accurate) would be misleading. It is more nearly correct to state that the tuberculosis death rate for such a country probably falls within certain limits, i. e., under 100, 100-149, or 150 or over per 100,000 population.

The first category in table 1, "very low prevalence" (tuberculosis death rates under 50 per 100,000) contains only the four countries whose low rates are truly descriptive of conditions in those areas. The remaining categories (under 100, 100-149, and 150 or over) contain not only countries whose reported rates fall within the stated limits, but also countries whose estimated mortality from tuberculosis probably falls within those limits. The second category, "low prevalence," is defined as tuberculosis death rates under 100 rather than 50-99 per 100,000 because of certain countries whose reported death rates of less than 50 per 100,000 are very likely the result of incomplete registration, but for which there are not sufficient data to prove that the true death rates are more than 50 per 100,000.

Figure 1 shows the geographical distribution of the countries in the various prevalence groups. The unshaded areas on the map are those for which no data could be obtained, and do not signify an absence of tuberculosis infection.

On the continent of Europe the areas of low prevalence fall in a rough vertical line. The areas of highest prevalence are to the east of this line.

Information on Asia leaves much to be desired, but that which exists indicates an almost universally high prevalence of tuberculosis. Japan and the Philippines experience a high prevalence of the disease, while in Australia, New Zealand, and Tasmania the prevalence is low.

Data on Africa are meager. Comparatively little is known concerning the health conditions on this continent. It has, however, been observed that in Liberia the prevalence of tuberculosis is in proportion to the spread of civilization. It is probable that a similar situation exists throughout much of Africa. Such data as could be found do not indicate any areas of high prevalence on this continent.

In North America the prevalence of tuberculosis is fairly low except in Alaska, Labrador, and Newfoundland. Much of South America has a high prevalence of the disease. There is a wedge of medium prevalence made up of Argentina, Uruguay, and probably Bolivia and Paraguay, while a low prevalence of tuberculosis probably prevails in Colombia, British Guiana, and Surinam.

There is apparently no marked correlation of tuberculosis with geographical position. Areas of high prevalence occur in the tropics, the temperate, and Arctic zones. The same is true of areas of low prevalence. It is notable that the majority of such areas, as well as all of the four countries with very low prevalence, are in the temperate

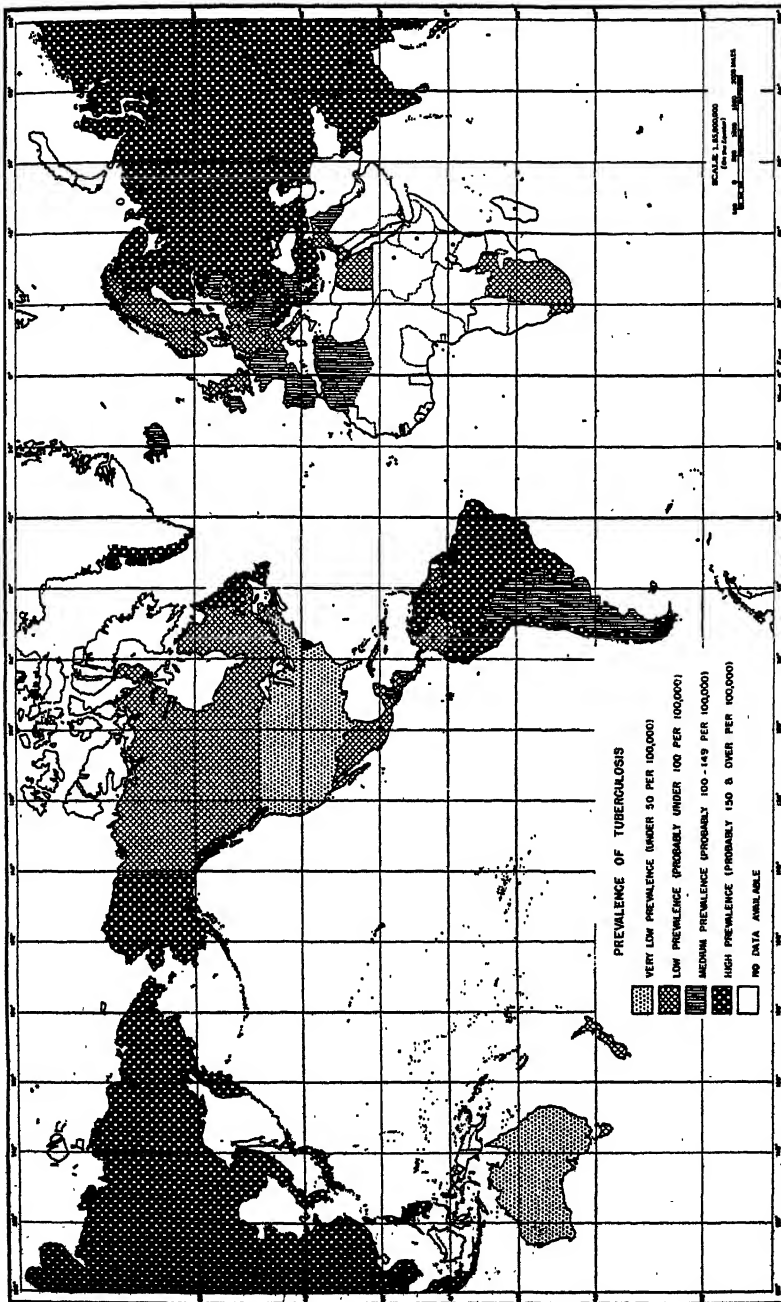


FIGURE 1.—Prevalence of tuberculosis as estimated from the probable death rates from all forms of tuberculosis in the various countries.

zones. From such data as could be obtained, climate appears to play a minor role, if any, in the prevalence of tuberculosis, and it is apparent that this disease has an extremely widespread occurrence throughout the world.

### **Specific Data Used in Estimating General Prevalence of Tuberculosis**

Insofar as possible, the countries are arranged by continental areas and their neighboring islands. For example, the Philippines and Japan are found under "The Asiatic area," and Greenland under "North America." In Europe the tuberculosis death rates are complete and accurate enough to justify ranking the countries by the magnitude of their rates. In the other areas the information is of more dubious character, and so the available data are discussed under each country. The countries are arranged alphabetically by areas.

#### **Europe**

The reporting of tuberculosis mortality was apparently quite adequate during the prewar years in western Europe. Difficulty was encountered in finding rates for Latvia, Poland, Russia,<sup>2</sup> and Yugoslavia, while no rate of any kind could be found for Albania.

From table 2 it is seen that only Denmark and the Netherlands have rates of less than 50 per 100,000. It will be noted from figure 2 that with the exception of the British Isles, the countries with rates of less than 100 lie in a rough vertical line while the countries to the west and east of this area all have rates of 100 or over. The highest rates for tuberculosis mortality occur in eastern Europe.

#### **The Asiatic Area**

Tuberculosis mortality is very poorly reported throughout the Asiatic Area. In many countries tuberculosis deaths are reported for urban areas only or not at all. In addition, there is an extreme scarcity of medical services so that the registration of causes of death is suspect, and usually there is no satisfactory enumeration of the population. For these reasons, a considerable amount of additional material, such as urban rates, estimates, and even impressions, is employed in the attempt to form some conception of the prevalence of this disease in some of the Asiatic countries.

<sup>2</sup> No published rate could be found. The classification of Russia is derived from the following statement: "The Commissar of Health declared in 1942 that mortality from tuberculosis had decreased by 80 percent to 160 per 100,000 population under the Soviet regime as compared with 1913-15 when it was 400 per 100,000 population." In *Civilian Medical Care and Incidence of Diseases in the U. S. S. R.*, Part I. Office of Strategic Services, Washington, 1946.

TABLE 2.—*European countries grouped by death rates from all forms of tuberculosis*

Country	Year	Tuberculosis death rate per 100,000	Country	Year	Tuberculosis death rate per 100,000
Under 50 per 100,000:			100-124 per 100,000—Contd.		
Denmark (♂).....	1939	34	Ire (♂).....	1939	113
Netherlands (♂).....	1939	41	Spain (♂).....	1939	122
50-74 per 100,000:			Czechoslovakia (♂).....	1937	124
Germany (♂).....	1939	50	125-149 per 100,000:		
England and Wales (♂).....	1939	62	Greece (♂).....	1936	128
Luxemburg (♂).....	1937	62	Iceland (♂).....	1937	132
Belgium (♂).....	1939	68	France (♂).....	1938	137
Scotland (♂).....	1939	70	Bulgaria (♂).....	1939	138
75-99 per 100,000:			Hungary (♂).....	1939	138
Sweden (♂).....	1939	75	Portugal (♂).....	1939	148
Italy (♂).....	1939	78	150 and over per 100,000:		
Switzerland (♂).....	1939	80	Russia (♂).....	1939 or 1940(?)	160
Northern Ireland (♂).....	1939	84	Estonia (♂).....	1937	161
Norway (♂).....	1939	86	Rumania (♂).....	1939	162
Lithuania (♂).....	1937	89	Finland (♂).....	1937	190
100-124 per 100,000:			Poland <sup>1</sup> .....	1931-32	195
Austria (♂).....	1933	100	Yugoslavia (♂) (pulmonary only).....	1933	234
Monaco (♂).....	1934(?)	100			
Latvia <sup>1</sup> .....	1929	109			

<sup>1</sup> Bull. Internat. Union against Tuberculosis. Paris, July 1931, pp. 298-331.<sup>2</sup> Bull. Internat. Union against Tuberculosis. Paris, January 1933, pp. 62-67.

TUBERCULOSIS DEATH RATES

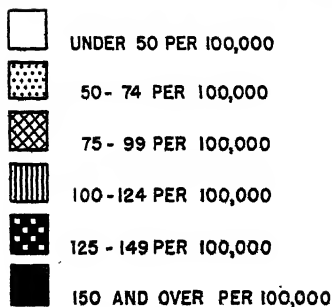


FIGURE 2.—Death rates from all forms of tuberculosis in European countries.



Table 3 presents the countries for which some sort of data could be found in very broad groupings according to their probable tuberculosis death rates. The data used in estimating these rates are so

TABLE 3.—*Asiatic countries grouped by probable death rates from all forms of tuberculosis*

Probably under 100 per 100,000	Probably 100-199 per 100,000	Probably 200-299 per 100,000	Probably 300 and over per 100,000
Ceylon. Palestine. Syria.	Formosa. Iraq. Java Kwangtung. Russia. Sumatra and the "Outer Provinces." Thailand. Turkey.	Aden. Burma. French Indochina. Japan. Korea. Philippines. Straits Settlements.	China. India.

fragmentary that finer groupings than under 100, 100-199, 200-299, and 300 and over do not seem justifiable. (In the introductory section of this paper, the group 100-149, medium prevalence, was used, but since only one Asiatic country, Thailand, falls in this range, the limits of the group are here extended to 100-199.) The geographical distribution of the countries falling in the various groups is shown in figure 3.

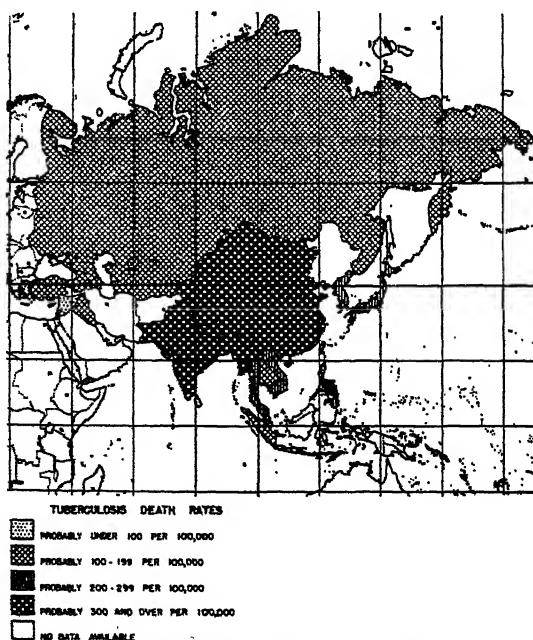


FIGURE 3.—Probable death rates from all forms of tuberculosis in Asiatic countries.

*Aden.*—In 1943 the tuberculosis death rate for Aden, Arabia, was 291 per 100,000 population (8). This high rate is given additional credence by the observation of a particularly high tuberculosis mortality among the Yemenite Jews in Palestine, since Yemen borders on Aden.

*Burma.*—In 1939, 3,196 deaths from all forms of tuberculosis, resulting in a mortality rate of 193, were reported in Burmese towns (?). The rate for Rangoon for the same years was estimated as 300 per 100,000 population. Tuberculosis deaths are inadequately reported in Burma. In many cases such deaths are called fever or respiratory disease. No rate is available for the entire country.

*Ceylon.*—In Ceylon, 3,630 deaths from all forms of tuberculosis were reported for the year 1939. The resulting rate is 62 per 100,000. In the same year, deaths from ill-defined causes comprised 12 percent of the total deaths. The death rate from tuberculosis for 1939 in Colombo, where the proportion of deaths from ill-defined causes was only 0.6 percent, was 197 (8). This high rate for Colombo, where reporting was more complete, would seem to indicate that the fairly low rate for the country as a whole is in part the result of incomplete reporting.

*China.*—The death rate from tuberculosis in 1937 was estimated as between 400 and 500 per 100,000.<sup>3</sup> Neither vital statistics nor population data are available for the entire country.

*Formosa.*—The rate for reported tuberculosis deaths was 161 per 100,000 population in 1934.<sup>4</sup>

*French Indochina.*—Deaths from tuberculosis are reported for three major cities only. In 1937 the rates for these cities were: Haiphong 263, Hanoi 181, and Saigon 296,<sup>5</sup> or 237 per 100,000 for the three cities combined. No data are available for the country as a whole.

*India.*—Tuberculosis deaths are reported only in the large cities of India. An effort to determine the rate for all India has been made by estimating that from 10 to 20 percent of all "fever" deaths, and 20 percent of the deaths from "respiratory disease" are caused by pulmonary tuberculosis. If 20 percent of each of these classifications are assumed to be pulmonary tuberculosis deaths, there would have been about 884,000 deaths from this cause in 1938. The resulting rate based on a population of 350,000,000 would be 283. The reference further states that nonpulmonary forms of tuberculosis are also common, and that the incidence of tuberculosis is increasing throughout India.<sup>6</sup>

*Japan.*—The death rate from all forms of tuberculosis was 207 per 100,000 population in 1936 (9). Japanese vital statistics are more complete than in most Asiatic countries.

*Java.*—Tuberculosis deaths are not reported at all in Java. The only information that could be found is the statement of F. Norman White in 1923 that pulmonary tuberculosis was very prevalent in this area (10).

*Korea.*—No statistics on the prevalence of tuberculosis are available. It is stated that "many of the inhabitants of Korea are tuberculous and reports indicate that the disease is increasing in prevalence."<sup>7</sup>

*Kwangtung.*—In the year 1934 the rate for reported deaths from all forms of tuberculosis was 192 per 100,000 population (9).

*Palestine, Syria, and Iraq.*—Tuberculosis mortality is reported only for residents of 11 cities and towns in Palestine. The urban population is less than half that of the entire country. In 1937 the tuberculosis death rate for urban areas only was reported as 56 per 100,000 population (11). It has been observed in Palestine

<sup>3</sup> Simmons, James Stevens; Wayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, pp. 57-58.

<sup>4</sup> Simmons, James Stevens; Wayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, p. 151.

<sup>5</sup> Simmons, James Stevens; Wayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, p. 153.

<sup>6</sup> Simmons, James Stevens; Wayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, pp. 121-122.

<sup>7</sup> Simmons, James Stevens; Wayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, p. 151.

that Moslems are reluctant to report tuberculosis, since it is very difficult to find husbands for girls in families known to be tuberculous, while Jews hesitate to report this disease because they object to going to government hospitals where Moslems also are treated. Such conditions would result in considerable under-reporting of deaths from this disease. However, since tuberculosis is usually concentrated in cities, the urban rate might be a useful measure of the mortality from this disease experienced by the whole country.

Tuberculosis deaths were not reported for Syria and Iraq. The rate for reported deaths from tuberculosis in Beirut, Syria, for 1938 was 78 and that for Baghdad, Iraq, in the same year 113 per 100,000 (12). These urban rates would seem to indicate a somewhat higher incidence of this disease than occurs in Palestine.

*Philippines.*—Tuberculosis death rates are reported for the Christian population, which comprises 90 percent of the total population of the Philippines. In 1938 the rate for all forms of this disease was 298 (13). Tuberculosis is said to be the leading single cause of death among adult Filipinos (14).

*Russia.*—The tuberculosis death rate for Asiatic Russia, like that of European Russia, is derived from the statement of the Health Commissar in 1942 to the effect that tuberculosis mortality in the U. S. S. R. had been reduced to 160 per 100,000 (1).

*Straits Settlements.*—In 1936 the rate for registered tuberculosis deaths for the Straits Settlements, exclusive of Cocos, Christmas, and Keeling Islands, was 202 per 100,000 population. In this area nearly 40 percent of the registered deaths are reported by the police without verification of cause of death (15).

*Sumatra and the "Outer Provinces".*—Two rather complete studies have been made of the cause of death of estate laborers in these areas. The 520,172 laborers studied included all the indentured and part of the nonindentured laborers in this area. The majority of the men in the indentured group were between 20 and 40, and the women were, for the most part, under 30, while the nonindentured laborers were older. The number of laborers repatriated because of tuberculosis as well as the case fatality rates expected in such a group were included in the studies. In 1930 the total loss, through death or repatriation from tuberculosis within the year was 219 per 100,000. It was estimated that of the 720 repatriated workers, 191 probably died within the year, raising the total deaths to 608, or a death rate from tuberculosis of 117 per 100,000 population (16).

The tuberculosis death rate among indentured workers is probably at a minimum because these workers were given physical examinations before they were brought to these areas. It should be further remembered that the rate is for selected age groups only and not comparable to rates for all ages. However, the rate would seem to indicate a fairly high prevalence of tuberculosis in these areas.

*Thailand.*—During the fiscal year 1937-38, 10,548 deaths from tuberculosis were recorded in Thailand, and the resulting rate was 73 per 100,000.<sup>8</sup> It is likely that the reporting of deaths from this cause is far from complete in this country.

*Turkey.*—In 1934 the rate for 31 Turkish cities and towns was 198 per 100,000. These urban areas make up about 11 percent of the population of Turkey (17). Tuberculosis deaths are not reported for rural areas.

From the available data it would appear that there is a high prevalence of tuberculosis throughout the Asiatic area, with the possible exceptions of Ceylon, Palestine, and Syria.

<sup>8</sup> Stramens, James Stevens; Whayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, p. 193.

### The Pacific Area

*Australia.*—In 1937 the death rate from all forms of tuberculosis in Australia was 40 per 100,000 population (3). This rate is for whites only. The aboriginal population is slightly more than 1 percent of the total population (18). Deaths from tuberculosis are not reported in this group. However, even if very high rates prevail among the aborigines, the total rate would not be greatly altered.

*Hawaii.*—In 1939 the death rate from all forms of tuberculosis in Hawaii was 67 per 100,000 population (19).

*New Zealand.*—As in Australia the reported tuberculosis death rate is for whites only. In 1939 this rate was 40, and in 1940, 39 per 100,000. In 1940 the Maoris constituted about 5 percent of the population of New Zealand. Tuberculosis mortality is extremely high in this group. The rate for the total population (including the Maoris) in 1940 was 60 per 100,000 (20), which is rather different from the usual published rate for New Zealand.

*Tasmania.*—The tuberculosis death rate for Tasmania was 53 per 100,000 in 1939 (21). The rate is probably for the white population only, as are the published rates for Australia and New Zealand, but it is not so stated.

*Western Pacific Islands.*—Hospital statistics and proportionate mortality indicate that tuberculosis is widespread throughout this area. The disease has been quite recently introduced and the course among the native population is rapid and lethal. Estimates of tuberculosis deaths run from 15 percent to 60 percent of the total deaths in the various islands. In American Samoa the death rate was 206 per 100,000 population in 1939.<sup>9</sup> In 1937 the tuberculosis death rate for the Friendly Islands was close to 300. Certification of cause of death must be very inaccurate, since less than 50 percent of the deaths are attended by physicians.<sup>10</sup>

Tuberculosis death rates for Australia, Hawaii, New Zealand, and Tasmania are low, but elsewhere in the Pacific Area the prevalence of tuberculosis is apparently very high.

### Africa

The available data on tuberculosis deaths in Africa are even more fragmentary than in Asia. It has been said that in the interior the spread of tuberculosis coincides with that of civilization, and will in the future be a problem of increasing seriousness. The data are too incomplete for a map of this area to be advisable.

*Algeria.*—In 1936, 265 tuberculosis deaths were reported in the European population (including Israelites), which numbered 946,013 or 13 percent of the total population. The resulting rate is 28 per 100,000 (22). The tuberculosis death rate for Algiers in the same year was 139, and in 1938, 176 (12). It has been observed in other North African countries that there is a much higher tuberculosis death rate among Moslems than among Europeans or Israelites. Even if the rate for the European population of Algeria were reasonably descriptive, which is doubtful, of the prevalence of tuberculosis in that group, it would be of little value in describing the prevalence of the disease in the entire population. If the situation observed in Tunisia holds true in Algeria, the remaining 87 percent of the population would be subjected to a rate at least 2.5 times as high as that for Europeans, and the resulting tuberculosis death rate would be at least 65 per 100,000.

<sup>9</sup> Simmons, James Stevens; Whayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, p. 346.

<sup>10</sup> Simmons, James Stevens; Whayne, Tom F.; Anderson, Gaylord West; Horack, Harold MacLachlan; and collaborators: *Global Epidemiology*. Philadelphia, J. B. Lippincott Co., 1944, vol. 1, p. 466.

*Egypt*.—Only in localities having a health bureau are tuberculosis deaths reported with any degree of completeness. These localities make up about 30 percent of the total population of Egypt. In 1939 the tuberculosis death rate was 52 per 100,000 population in these areas. According to Egyptian law, notification is in the first instance incumbent upon the relatives of the deceased or upon any male person residing in the same house. Only in the absence of such a person is the notification of death incumbent upon a physician or the health representative (23). Apparently no effort is made to verify the cause of death.

*Mauritius*.—In 1938 the death rate from tuberculosis was reported as 81 per 100,000 population on this island (24).

*Morocco*.—Data are available for 18 municipalities which comprised about 16 percent of the total population for the year 1937. The death rate for all forms of tuberculosis in these localities was 142 per 100,000. This rate is further broken down by three racial groups, Moslems 177, Israelites 48, and Europeans 61 per 100,000 population.<sup>11</sup> This racial break-down corroborates Masselot's findings in Tunisia. The rate for Casablanca in the same year was 136 per 100,000 (12).

*Tunisia*.—In 1938, 795 deaths from tuberculosis were reported in Tunisia. The rate, based on the 1936 population of 2,608,300, would be 30 per 100,000. It is obvious that tuberculosis deaths are very incompletely reported. In the same year the tuberculosis death rate in Tunis was 262 (12). Masselot, in his article on the campaign against tuberculosis in Tunisia, states that there are approximately 2,050,000 Moslems and 250,000 Europeans in Tunisia, and that in Tunis the tuberculosis death rate is 2.5 times higher among natives than among Europeans.<sup>12</sup>

*Union of South Africa*.—The published death rates for the Union of South Africa are for Europeans only. In 1937 the tuberculosis death rate for this portion of the population was 37 per 100,000 (3). Some idea of how poorly such a rate indicates the prevalence of tuberculosis in the total population can be obtained from the rates of three large cities by race.

City	Year	Total	Euro- pean	Tuberculosis death rates (colored)			
				Total	Natives	Eurafric- an	Asiatics
Capetown (25).....	Year ending June 30, 1941....	270	73	477	-----	-----	-----
Durban (26).....	Year ending June 30, 1939....	310	120	-----	550	580	890
Johannesburg (27).....	Year ending June 30, 1938....	77	20	-----	138	203	94

The rates for the total population in these cities are from 2.5 to nearly 4 times the rates for the European population. It is probable that the rate for the entire population of the Union of South Africa would be at least 2.5 times as high as that for Europeans, or somewhere around 90 per 100,000.

From such data as can be found for Africa it would appear that the tuberculosis death rates of the European population are quite low, while the native population suffers severely from this disease. There is reason to believe that the severity of this problem will increase in Africa as more and more of the isolated regions come under the influence of civilization.

<sup>11</sup> Bull. Internat. Union Against Tuberculosis. Paris, July 1937. Pp. 402-409.

<sup>12</sup> Masselot, Felix: Campaign against Tuberculosis in Tunisia. Bull. Internat. Union Against Tuberculosis. Paris, July 1937.

## The Americas

Information on tuberculosis mortality is fairly complete for North America. This is not the case in Latin-American countries where medical services are meager and population statistics far from complete. Dunn, Eldridge, and Powell (28) in their study of the demographic status of South America make the following observation on data concerning cause of death:

"The causes of death in South American countries are in a large measure unknown. Except in large cities where hospital facilities are available, relatively few deaths are certified by physicians \* \* \*. It may be observed that senility appears as one of the leading causes of death in seven of the countries \* \* \*. A large percentage of deaths are attributed to ill-defined and unknown causes in all but a few places."

The lack of accuracy in reporting tuberculosis deaths in Latin America is particularly apparent in the great differences which appear between the rates for the countries and those for the large cities within their borders.

In table 4 the various countries are grouped according to their death rates from all forms of tuberculosis. In many instances the grouping is based on estimated tuberculosis mortality rather than on the reported tuberculosis death rates, which are obviously incomplete.

TABLE 4.—*Countries of the Western Hemisphere grouped by probable death rates from all forms of tuberculosis*

Under 50 per 100,000	Probably 50-99 100,000	Probably 100-149 per 100,000	Probably 150-249 per 100,000	250 and over per 100,000
United States.	British Guiana. Canada. Colombia. Cuba. Curacao. Granada. Honduras. Mexico. Surinam. Virgin Islands.	Argentina. Bolivia. Dominican Republic. Guatemala. Nicaragua. Panama. Paraguay. Santa Lucia. Trinidad and Tobago. Uruguay.	Costa Rica. El Salvador. Haiti. Newfoundland and Labrador. Peru. Venezuela.	Alaska. Brazil. Chile. Greenland. Puerto Rico.

Broad groupings under 50, 50-99, 100-149, 150-249, and 250 and over are used in order to minimize the errors which may occur in such estimates and impressions. The geographic distribution of the countries in the various groups is shown in figure 4.

## North America

*Alaska.*—In 1936 the tuberculosis death rate for Alaska was 437 per 100,000 population. Approximately half the population is native and half is white. The white death rate (63 in 1936) is incomplete, since deaths of the white population occurring in sanatoria outside Alaska are not reallocated to place of residence. On the other hand, the Indian death rate (794 in 1936) is said to be too high because of a tendency to certify as tuberculosis deaths from obscure or protracted illnesses (29).

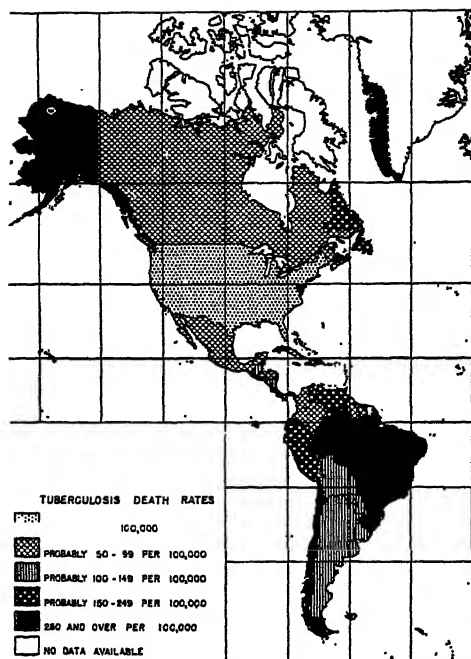


FIGURE 4.—Probable death rates from all forms of tuberculosis in countries in the Western Hemisphere.

*Canada.*—The death rate from all forms of tuberculosis for Canada in 1939 was 53 per 100,000 population (30).

*Greenland.*—In Greenland tuberculosis constitutes a major health problem. In 1937, there were 99 deaths from tuberculosis, or a rate of 550 per 100,000 population, on the west coast of Greenland (31).

*Mexico.*—The tuberculosis death rate for Mexico was 56 per 100,000 in 1939. About 7 percent of the total registered deaths are from ill-defined causes (32). Probably the actual tuberculosis death rate for Mexico is somewhat higher than the reported rate, but the published rate is doubtless as reliable as that of any Latin-American country.

*Newfoundland and Labrador.*—In 1938 the death rate from all forms of tuberculosis was reported to be 198 per 100,000 population in Newfoundland and Labrador (33).

*United States.*—The death rate for all forms of tuberculosis in the United States was 47 per 100,000 in 1939. The rate for whites only (comparable with the published rates of Australia, New Zealand, and the Union of South Africa) was 38 per 100,000 in the same year (33).

#### Central and South America

In both Central and South America it is likely that the low rates reported by many countries are due to serious defects in reporting rather than to a low prevalence of tuberculosis. An additional note on the situation comes from Puerto Rico. Arbona and Morales-Otero (34) state that, "This disease [tuberculosis] carries with it a stigma in a large part of Latin America, and deaths known to be due to tuberculosis are often attributed to other conditions."

*Argentina.*—The tuberculosis death rate for Argentina in 1937 was reported as 103 per 100,000 population. This rate appears to be a fair estimate of the mortality from tuberculosis in this country as the rate for Buenos Aires was 123 in the same year (32).

*Bolivia.*—In 1940 tuberculosis was said to be the third cause of death in Bolivia. The number of deaths reported (813) was considered so incomplete that a rate was not computed. In this year La Paz reported a death rate from all forms of tuberculosis of 128, Potosi a rate of 164, and Tarija a rate of 305 per 100,000 population (32). The rate for these three cities combined was 154 per 100,000. Less than 50 percent of the reported tuberculosis deaths occurred elsewhere in Bolivia, which is particularly striking as these three cities account for but 9 percent of the population of the country.

*British Guiana and Surinam.*—The rate for reported tuberculosis deaths in British Guiana was 63 in 1939 and 82 in 1938 (32). The medical inspector of Surinam reported that the rate for tuberculosis mortality in his country was 47 per 100,000 in 1939, and 70 in 1938. The rates in both these countries are based on estimated populations and undoubtedly are subject to inadequate reporting of deaths by cause. Both these countries contain vast isolated areas where the tuberculosis infection has probably not yet been introduced.

*Brazil.*—The rate for mortality from all forms of tuberculosis in the principal cities of Brazil was 272 per 100,000 in 1939 (35). In 1934 the rate for the entire country was estimated to be 250 per 100,000 (32), which seems a reasonable estimate of mortality from tuberculosis in this country.

*Chile.*—The rate for recorded tuberculosis deaths in Chile in 1939 is given variously as 264 (36) and 247 (32) per 100,000. The difference in the rates is very likely due to differences in the population base used. A census was taken in 1940, and one rate is probably based on this enumerated population, while the other is based on the estimated population for 1939. The rate for Santiago in 1938 was 453 per 100,000 (32).

*Colombia.*—The rate for reported deaths from tuberculosis in Colombia was 47 per 100,000 for the year 1939. The rate for Bogota in the same year was 150 (32). While there are doubtless many areas in Colombia where tuberculosis has not yet been disseminated, the low rate is probably due to a greater degree to limitations in reporting deaths by cause.

*Costa Rica.*—In 1939 the rate for reported mortality from all forms of tuberculosis in Costa Rica was 86 per 100,000 (32). This rate was considered incomplete. The true number of deaths from this cause was estimated to be twice the number reported (37), or 172 per 100,000 population.

*Ecuador.*—The rate for reported deaths from tuberculosis in Ecuador in 1939 was 74 per 100,000. In the same year the rate for Guayaquil was 737 (32). Such an extreme difference must be due in part to inadequate registration of cause of death in the country as a whole.

*El Salvador.*—The published rate for El Salvador in 1939 was 43 per 100,000. An adjusted rate based on a "hypothetical" method of the El Salvador Public Health Service was given as 53 in this year. The rate for reported deaths for the city of San Salvador was 376 for the year 1939 (32), which would appear to indicate that even the adjusted rate is considerably lower than the true mortality from this disease in El Salvador.

*Guatemala.*—In 1938 the tuberculosis death rate for Guatemala was reported as 64 per 100,000. In this country 13 percent of all deaths are registered as "cause ill-defined or not stated." The certification of cause of death is probably inaccurate in many instances. The tuberculosis mortality rate for Guatemala City, where the reporting was more complete, was 238 in 1939, and probably indicates that the reported rate for the whole country is too low (32).



*Honduras*.—Tuberculosis is said to be the second single cause of death in Honduras, but the number of such deaths is not known (32). The rate for reported deaths from pulmonary tuberculosis in 1939 was 27 per 100,000 (38). The rate for Tegucigalpa in 1939 was given as 93 (32). As in other Central American countries the reported deaths from tuberculosis are but a fraction of those which should be attributed to this cause.

*Nicaragua*.—Only 47 percent of the deaths in this country are certified by physicians. In 1939, 281 deaths from pulmonary tuberculosis were reported, or 29 per 100,000 (39). Such a low rate is the result of gross error in the certification of cause of death. The death rate from all forms of tuberculosis in Managua was 185 in the same year (32).

*Panama*.—In 1934 the rate for reported deaths from all forms of tuberculosis in Panama was 97, and in 1943, 199 per 100,000. No rate for 1939 is available for the entire country, but in this year the tuberculosis death rate for the Panama Canal Zone was 29, that for Colon 150, and for Panama City 247 per 100,000 (40). The rate for 1943 is probably a reasonable index of tuberculosis deaths for the entire country in 1939.

*Paraguay*.—Tuberculosis deaths are reported only for biodemographic districts in Paraguay. In 1940 these districts consisted of 25 towns with a population of 395,998 or approximately 40 percent of the total population. The rate for reported tuberculosis mortality in these localities was 102 in 1939. The rate for Asuncion was 180 per 100,000 in the same year (32).

*Peru*.—In 1941 the rate for reported deaths from this cause was 79 per 100,000 for the entire country. In the same year the rate for Lima was 359 (41). While the discrepancy between the rate for the country as a whole and that of the major city is less than in Ecuador, it is still very marked.

*Uruguay*.—In 1939 the tuberculosis death rate for Uruguay was 101 per 100,000 population, and that for the city of Montevideo, 189 (32). Uruguay and Chile have more complete vital statistics than are found elsewhere in South America.

*Venezuela*.—In this country 59 percent of the deaths are assigned to ill-defined causes. In 1939 the rate for reported tuberculosis deaths was 99, and in 1940, 95 per 100,000. An adjusted rate of 233, which allows for the incomplete registration of cause of death, was computed in Venezuela for 1940. The higher rate is undoubtedly much nearer the actual tuberculosis death rate in this country. The rate for Caracas in this year was 307 per 100,000 (32).

### The Caribbean Area

*Curacao, Granada, and Santa Lucia*.—The tuberculosis death rate for Curacao in 1937 is reported as 44 per 100,000. The rates for Granada and Santa Lucia were 86 and 100, respectively, for 1939 (32). The population in these islands is so small that there is considerable fluctuation in their rates from year to year.

*Cuba*.—The death rate from tuberculosis in Cuba for the year 1937 is variously given as 71 (32) and 76 (42) per 100,000. As in Chile the discrepancy is due to the difference in the population on which the rate is based. The lower rate is based on the 1939 population. The rate for Havana in this year was 144 per 100,000 (32).

*Haiti and the Dominican Republic*.—The population of Haiti is not accurately known. It is estimated that only 20 percent of the deaths which occur are reported. In 1939, 75 percent of the reported deaths were recorded as from ill-defined or unknown causes. In spite of these difficulties in estimating the mortality from any cause, tuberculosis is considered the leading cause of death, and an estimated rate of 231 per 100,000 was reported for the year 1939.<sup>12</sup>

<sup>12</sup> Bulletin de la Organisation Pan-Américaine, Washington, September 1941, p. 330.

In the Dominican Republic the category "cause ill-defined or not stated" included 23 percent of all deaths. The admittedly incomplete rate of 65 was reported for 1939. In the same year the rate for the city of Trujillo was reported to be 193 per 100,000 (32).

*Jamaica.*—The tuberculosis death rate for Jamaica in the year 1938 was reported as 97 per 100,000 population (32).

*Puerto Rico.*—The tuberculosis mortality rate for Puerto Rico was 257 per 100,000 in 1939 (48). Arbona and Morales-Otero (34) state, "As regards tuberculosis, the available information gives us an idea of the minimum death rates for tuberculosis [in Puerto Rico], but undoubtedly the true rates are far higher."

*Trinidad, Tobago, and the Virgin Islands.*—The rate for deaths from tuberculosis in Trinidad and Tobago was reported as 101 in 1939, and 95 per 100,000 in 1941. The tuberculosis death rate for Port au Spain was 222 in the latter year (32).

The tuberculosis death rate for the Virgin Islands was reported as 81 per 100,000 for the year 1939 (32).

### Summary

Tuberculosis appears to be widely disseminated throughout all areas which have been to any degree subject to the influence of civilization.

The only countries which can be said with any certainty to have tuberculosis death rates of less than 50 per 100,000 in the prewar period are Denmark and the Netherlands in Europe, the United States, and Australia. If the rates for the white population only are considered, New Zealand and the Union of South Africa may be added to this list.

A high prevalence of tuberculosis probably exists throughout eastern Europe and Asia, with the possible exceptions of Ceylon and Palestine, where the reported rates are fairly low. Very high rates were found in Alaska, Greenland, Newfoundland, and Labrador. It is probable that all Latin America experiences a very high prevalence of this disease. It is also probable that the prevalence of tuberculosis is fairly high in North Africa with the possible exception of Egypt, although definite data are meager.

Certainly tuberculosis control is a problem of world-wide importance. The prewar distribution of this disease is alarming, and it is certain that the problem will be intensified during the postwar years, particularly in Europe.

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# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED JULY 13, 1946

#### Summary

A total of 427 cases of poliomyelitis was reported for the current week, as compared with 311 (3 delayed reports) for the preceding week. Of 42 States in which changes occurred, 31 reported an aggregate increase of 161 cases, while 11 reported a total decrease of 45 cases, making a net increase of 116 cases. The most significant increases occurred in Minnesota (20 to 40), Kansas (4 to 18), Illinois (13 to 23), and Michigan (1 to 11). Increases of 9 cases each were reported in Arkansas (20 cases), Texas (54), and Colorado (31), and of 8 cases each in California (25) and Nebraska (12). The largest numerical decreases were reported for Florida (32 to 24), Alabama (25 to 14), and Georgia (15 to 3). The cumulative total to date is 2,594, as compared with 1,679 in 1945, 1,752 in 1944, and 1,626 in 1943 for the same period. The 5-year (1941-45) median for the same period is 1,626. Similar to the situation somewhat later last year, the excess in incidence above the normal expectancy is due to a moderately high incidence in a large number of States, as contrasted with 1944, when it was accounted for by excessively high incidence in a smaller number of States.

The incidence of diphtheria is on the decline. During the current week, 197 cases were reported, as compared with 207, 218, and 222 for the immediately preceding weeks. The total this year to date is 8,825 cases, as compared with 7,120 in 1945 and a 5-year median of 6,628 for the same period.

Of 17 cases of infectious encephalitis reported during the week, 6 occurred in California. Of 6 cases of smallpox, 3 occurred in Indiana, 2 in Arkansas, and 1 in Kentucky.

A total of 8,770 deaths was reported in 42 large cities in the United States, as compared with 7,384 last week and a 5-year average of 8,221. To date, 265,179 deaths have been reported in these cities, as compared with 269,123 for the same period last year.

*Telegraphic morbidity reports from State health officers for the week ended July 13, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	July 13, 1946	July 14, 1945		July 13, 1946	July 14, 1945		July 13, 1946	July 14, 1945		July 13, 1946	July 14, 1945	
NEW ENGLAND												
Maine.....	2	0	0	—	—	—	99	1	36	0	1	1
New Hampshire.....	0	0	0	—	—	—	10	1	3	0	0	0
Vermont.....	0	0	0	—	—	—	101	18	87	0	0	0
Massachusetts.....	7	2	4	—	—	—	962	188	232	4	1	4
Rhode Island.....	0	0	0	—	25	—	51	—	9	0	0	1
Connecticut.....	0	1	1	1	1	1	138	41	66	1	2	2
MIDDLE ATLANTIC												
New York.....	15	8	8	(1)	1	13	1,149	84	485	10	18	18
New Jersey.....	2	4	4	2	2	1	710	34	170	6	3	3
Pennsylvania.....	9	6	9	1	—	—	386	181	181	8	3	6
EAST NORTH CENTRAL												
Ohio.....	12	4	4	1	3	2	354	33	64	2	7	7
Indiana.....	1	6	3	—	3	4	33	12	18	5	3	2
Illinois.....	7	5	7	2	1	2	110	304	228	6	4	4
Michigan.....	4	13	4	7	1	1	230	195	195	5	8	8
Wisconsin.....	1	6	2	18	1	6	560	61	352	0	3	3
WEST NORTH CENTRAL												
Minnesota.....	2	2	1	—	—	—	21	5	52	3	4	2
Iowa.....	4	1	1	—	—	—	43	28	39	2	0	0
Missouri.....	1	4	1	1	3	—	23	24	81	1	2	7
North Dakota.....	2	1	3	—	—	—	9	1	8	0	0	0
South Dakota.....	4	3	1	—	—	—	6	5	8	0	1	0
Nebraska.....	0	3	1	—	2	2	4	7	12	1	1	0
Kansas.....	9	14	2	—	—	—	23	20	33	2	2	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	6	—	1	0	0	0
Maryland.....	6	4	1	1	1	1	236	8	40	0	2	2
District of Columbia.....	1	0	0	—	1	—	51	1	24	1	1	1
Virginia.....	2	2	2	47	38	42	102	6	57	4	3	3
West Virginia.....	4	3	2	—	32	1	4	—	23	0	4	1
North Carolina.....	9	9	4	—	—	—	98	17	61	0	0	1
South Carolina.....	2	4	4	64	49	68	86	12	12	0	2	2
Georgia.....	4	4	4	4	4	6	34	—	20	1	0	0
Florida.....	6	3	3	7	—	4	14	1	16	1	3	3
EAST SOUTH CENTRAL												
Kentucky.....	5	4	1	—	—	—	7	20	16	1	5	4
Tennessee.....	7	2	2	11	5	5	20	7	15	0	2	3
Alabama.....	11	3	5	6	6	5	41	2	16	0	7	3
Mississippi.....	3	7	4	—	—	—	—	—	—	3	3	3
WEST SOUTH CENTRAL												
Arkansas.....	2	4	4	9	3	3	11	15	15	2	2	1
Louisiana.....	5	10	2	6	4	4	10	9	9	2	4	3
Oklahoma.....	5	0	3	5	7	7	34	8	10	1	1	0
Texas.....	25	44	23	275	391	253	266	135	118	3	9	4
MOUNTAIN												
Montana.....	3	2	1	—	1	—	52	4	21	0	0	0
Idaho.....	0	1	1	4	10	—	11	19	3	0	1	1
Wyoming.....	0	1	0	—	—	—	8	1	9	0	0	0
Colorado.....	2	6	4	9	21	6	47	7	32	0	0	0
New Mexico.....	0	0	0	—	—	—	20	3	3	0	0	0
Arizona.....	0	2	2	6	14	16	30	8	15	0	1	0
Utah.....	0	2	0	—	—	—	31	110	21	0	0	0
Nevada.....	0	0	0	—	—	—	—	—	5	0	0	0
PACIFIC												
Washington.....	4	3	0	—	—	—	16	92	74	0	2	2
Oregon.....	0	4	4	—	1	4	33	26	30	0	1	1
California.....	8	18	18	18	6	19	414	373	373	6	12	12
Total.....	197	228	181	506	637	549	6,729	2,133	5,265	87	126	126
52 weeks.....	8,825	7,120	6,628	189,238	67,692	78,995	628,672	95,578	522,593	4,110	5,656	5,656

\* New York City only.

\* Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended July 13, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>2</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	July 13, 1946	July 14, 1945		July 13, 1946	July 14, 1945		July 13, 1946	July 14, 1945		July 13, 1946	July 14, 1945	
NEW ENGLAND												
Maine.....	0	1	1	8	11	9	0	0	0	1	0	0
New Hampshire.....	4	0	0	6	2	2	0	0	0	0	0	0
Vermont.....	0	1	0	2	4	3	0	0	0	0	0	0
Massachusetts.....	0	2	2	43	60	84	0	0	0	5	2	3
Rhode Island.....	0	0	0	6	6	2	0	0	0	1	0	0
Connecticut.....	4	4	2	4	4	8	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York.....	15	29	11	135	122	113	0	0	0	3	7	7
New Jersey.....	6	23	1	44	23	30	0	0	0	3	1	2
Pennsylvania.....	1	4	4	83	63	63	0	0	0	4	8	8
EAST NORTH CENTRAL												
Ohio.....	13	10	3	57	57	57	0	0	0	8	8	8
Indiana.....	3	1	1	10	29	17	3	1	0	14	2	7
Illinois.....	23	4	6	43	82	71	0	2	0	10	3	3
Michigan <sup>2</sup> .....	11	1	3	70	117	46	0	1	1	1	11	5
Wisconsin.....	4	1	0	19	40	37	0	0	0	2	0	1
WEST NORTH CENTRAL												
Minnesota.....	40	0	1	12	29	20	0	0	0	1	0	0
Iowa.....	8	1	2	8	15	10	0	0	0	0	0	1
Missouri.....	14	1	1	3	16	13	0	1	0	2	0	6
North Dakota.....	1	0	0	2	8	3	0	0	0	0	0	0
South Dakota.....	5	0	0	0	1	4	0	0	0	0	0	0
Nebraska.....	12	0	0	4	18	7	0	0	0	0	0	0
Kansas.....	18	5	3	11	21	19	0	0	0	0	0	1
SOUTH ATLANTIC												
Delaware.....	0	1	0	1	4	3	0	0	0	0	0	0
Maryland.....	3	3	1	5	19	17	0	0	0	1	2	3
District of Columbia.....	1	6	0	2	7	7	0	0	0	0	0	1
Virginia.....	3	7	5	22	19	8	0	0	0	1	3	6
West Virginia.....	1	8	0	6	9	12	0	0	0	0	4	4
North Carolina.....	1	2	1	16	7	8	0	0	0	2	3	7
South Carolina.....	3	11	5	1	4	3	0	0	0	4	9	8
Georgia.....	2	8	8	8	8	7	0	0	0	4	4	8
Florida.....	24	1	2	2	2	2	0	0	0	1	4	4
EAST SOUTH CENTRAL												
Kentucky.....	5	0	10	6	12	12	1	0	0	3	3	10
Tennessee.....	1	27	5	6	16	16	0	0	0	6	5	11
Alabama.....	14	6	6	5	11	8	0	0	0	0	5	7
Mississippi <sup>2</sup> .....	6	2	2	4	11	3	0	0	0	5	2	7
WEST SOUTH CENTRAL												
Arkansas.....	20	3	3	6	9	3	2	1	0	9	6	14
Louisiana.....	18	1	1	4	7	4	0	0	0	5	6	11
Oklahoma.....	15	8	1	2	7	7	0	0	0	4	1	6
Texas.....	54	45	13	33	32	25	0	0	0	28	22	25
MOUNTAIN												
Montana.....	6	0	0	1	5	7	0	0	0	1	2	0
Idaho.....	0	1	0	5	2	2	0	0	0	2	1	1
Wyoming.....	0	1	0	6	2	4	0	0	0	0	0	0
Colorado.....	31	1	1	36	11	11	0	0	0	0	1	1
New Mexico.....	1	0	0	7	2	3	0	0	0	0	0	0
Arizona.....	1	0	0	8	5	3	0	0	0	1	1	1
Utah <sup>2</sup> .....	0	0	0	4	6	6	0	0	0	0	2	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	5	5	2	15	16	14	0	0	0	1	0	0
Oregon.....	5	2	1	5	9	9	0	0	0	0	2	0
California.....	25	22	12	69	131	69	0	0	0	1	3	4
Total.....	427	254	254	855	1,101	884	6	6	6	134	133	207
28 weeks.....	2,594	1,679	1,626	83,792	130,156	93,975	4,264	254	584	1,821	2,004	2,401

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 2; Rhode Island 1; New York 2; New Jersey 1; Georgia 1; Arkansas 1; Louisiana 1; Texas 4; California 1.

<sup>3</sup> Delayed report: Smallpox, Kentucky 2 cases in April; total for April, 3 cases.

Telegraphic morbidity reports from State health officers for the week ended July 13, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended July 13, 1946								
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever	
	July 13, 1946	July 14, 1945		Ame- bic	Bacil- lary	Un- spec- ified						
NEW ENGLAND												
Maine.....	6	50	27	—	—	—	—	—	—	—	1	
New Hampshire.....	2	6	3	—	—	—	—	—	—	—	—	
Vermont.....	19	27	27	—	—	—	—	—	—	—	2	
Massachusetts.....	104	117	116	—	1	—	—	—	—	—	2	
Rhode Island.....	29	19	12	—	—	—	—	—	—	—	—	
Connecticut.....	30	28	28	3	—	—	—	—	—	—	1	
MIDDLE ATLANTIC												
New York.....	124	327	301	3	2	—	2	2	—	—	2	
New Jersey.....	150	221	221	1	—	2	1	2	—	—	—	
Pennsylvania.....	84	244	244	—	—	—	—	2	—	—	3	
EAST NORTH CENTRAL												
Ohio.....	79	155	223	—	—	—	1	—	—	—	—	
Indiana.....	29	46	46	—	—	—	—	—	—	—	3	
Illinois.....	141	128	145	3	1	—	2	4	—	—	15	
Michigan.....	148	75	198	7	8	1	—	—	—	—	5	
Wisconsin.....	149	49	168	—	—	—	—	—	—	—	6	
WEST NORTH CENTRAL												
Minnesota.....	10	9	64	—	—	—	—	—	1	—	3	
Iowa.....	28	4	44	—	—	—	—	—	—	—	24	
Missouri.....	15	33	33	—	—	1	—	1	1	—	1	
North Dakota.....	2	—	16	—	—	—	—	—	—	—	—	
South Dakota.....	—	—	3	—	—	—	—	—	—	—	4	
Nebraska.....	3	2	24	—	—	—	—	1	—	—	1	
Kansas.....	27	36	63	1	—	—	—	—	—	—	4	
SOUTH ATLANTIC												
Delaware.....	8	—	2	—	—	—	—	1	—	—	—	
Maryland.....	41	70	70	—	—	—	—	2	1	—	1	
District of Columbia.....	21	12	12	—	—	—	—	—	—	—	—	
Virginia.....	117	115	50	—	—	50	—	2	1	1	1	
West Virginia.....	21	45	38	—	—	—	—	—	—	—	—	
North Carolina.....	134	207	213	—	—	—	—	5	2	4	1	
South Carolina.....	36	66	88	7	25	—	—	1	—	2	4	
Georgia.....	20	15	15	—	3	—	—	2	—	15	—	
Florida.....	33	1	13	3	—	1	—	2	—	14	—	
EAST SOUTH CENTRAL												
Kentucky.....	15	59	59	—	4	—	—	2	—	—	1	
Tennessee.....	49	45	45	—	1	—	—	—	5	1	4	
Alabama.....	22	14	31	1	—	—	1	—	1	18	2	
Mississippi.....	—	—	—	—	—	—	—	—	1	5	7	
WEST SOUTH CENTRAL												
Arkansas.....	11	18	20	2	—	—	1	—	7	3	2	
Louisiana.....	1	—	5	—	—	—	—	1	1	15	—	
Oklahoma.....	21	21	21	1	1	—	—	—	—	—	—	
Texas.....	224	258	253	29	329	31	—	—	4	50	20	
MOUNTAIN												
Montana.....	1	14	14	—	—	—	—	—	1	—	—	
Idaho.....	4	15	15	—	1	—	—	—	—	—	4	
Wyoming.....	9	1	4	—	—	—	—	1	—	—	—	
Colorado.....	29	44	38	—	—	—	—	—	—	—	1	
New Mexico.....	11	5	10	—	1	—	—	—	—	—	—	
Arizona.....	14	14	14	—	—	16	—	—	—	—	—	
Utah.....	18	35	60	—	—	—	—	—	2	—	—	
Nevada.....	—	—	—	—	—	—	—	—	—	—	—	
PACIFIC												
Washington.....	20	20	52	—	—	—	—	—	—	—	—	
Oregon.....	48	22	22	2	—	—	—	—	—	—	—	
California.....	71	231	195	2	3	—	9	—	—	1	4	
Total.....	2,176	2,923	3,699	65	375	102	17	28	28	129	129	
Same week, 1945.....	2,923	—	—	43	744	28	9	35	17	124	96	
Average, 1943-45.....	3,104	—	—	40	781	274	12	19	17	123	—	
23 weeks: 1946.....	53,039	—	—	1,571	9,551	3,524	260	220	531	1,635	2,637	
1945.....	70,366	—	—	—	934	12,992	3,543	194	204	1,822	2,606	
Average, 1943-45.....	73,707	—	105,735	944	10,378	3,253	275	237	429	1,607	—	

\* Period ended earlier than Saturday.

† Anthrax: New York 1 case.

\* 5-year median, 1941-45.

† Leprosy: Louisiana 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended July 6, 1946

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	20	0	1	1	0	0	0	1
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Massachusetts:												
Boston.....	2	0	-----	1	77	0	10	1	8	0	1	11
Fall River.....	0	0	-----	0	27	0	0	0	0	0	0	-----
Springfield.....	0	0	-----	0	26	0	0	0	4	0	1	1
Worcester.....	2	0	-----	0	55	0	4	0	1	0	3	23
Rhode Island:												
Providence.....	0	0	-----	0	31	0	2	0	2	0	0	13
Connecticut:												
Bridgeport.....	0	0	-----	0	-----	0	0	0	0	0	1	-----
Hartford.....	0	0	-----	0	4	1	0	1	0	0	0	4
New Haven.....	0	0	-----	0	24	0	0	0	0	0	0	-----
MIDDLE ATLANTIC												
New York:												
Buffalo.....	3	0	-----	0	5	0	3	0	0	0	0	-----
New York.....	8	1	3	1	137	2	43	6	44	0	4	34
Rochester.....	0	0	-----	0	3	0	1	0	7	0	1	-----
Syracuse.....	0	0	-----	0	-----	0	0	1	6	0	0	4
New Jersey:												
Camden.....	0	0	-----	0	1	0	0	0	0	0	0	1
Newark.....	0	0	-----	0	24	1	1	0	7	0	0	18
Trenton.....	0	0	-----	0	18	0	0	0	0	0	0	3
Pennsylvania:												
Philadelphia.....	3	0	3	0	21	3	13	1	11	0	0	21
Pittsburgh.....	1	0	-----	0	25	0	0	0	12	0	0	7
Reading.....	0	0	-----	0	2	0	1	0	1	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0	-----	0	6	0	2	0	2	0	0	5
Cleveland.....	1	0	1	1	165	2	3	9	13	0	1	11
Columbus.....	0	0	-----	0	12	0	2	0	1	0	0	1
Indiana:												
Fort Wayne.....	0	0	-----	0	2	0	1	0	0	0	0	-----
Indianapolis.....	0	0	-----	0	6	0	1	0	1	0	1	7
Terre Haute.....	0	0	-----	0	5	0	1	0	0	0	0	-----
Illinois:												
Chicago.....	0	0	-----	0	42	1	14	0	31	0	0	50
Springfield.....	0	0	-----	0	1	0	3	0	0	0	0	-----
Michigan:												
Detroit.....	0	0	-----	0	17	0	9	2	15	0	1	28
Flint.....	0	0	-----	0	3	0	2	0	1	0	0	6
Grand Rapids.....	0	0	-----	0	14	0	1	0	4	0	1	3
Wisconsin:												
Kenosha.....	0	0	-----	0	14	0	0	0	0	0	0	-----
Milwaukee.....	1	0	-----	0	41	0	2	0	7	0	2	31
Racine.....	0	0	-----	0	141	0	0	0	2	0	0	-----
Superior.....	0	0	-----	0	-----	0	0	0	0	0	0	6
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	1	0	-----	0	4	0	0	0	0	0	0	1
Minneapolis.....	1	0	-----	0	7	0	5	14	6	0	0	3
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	3	1	0	0	0	4
St. Joseph.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
St. Louis.....	0	1	1	0	17	1	3	3	4	0	0	4



## City reports for week ended July 6, 1946—Continued

	Diphtheria cases	Erysipelas, infections, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	—	0	—	0	0	0	1	0	0	—
Nehraske:												
Omaha.....	1	0	—	0	2	0	0	0	0	0	0	3
Kansas:												
Topeka.....	0	0	—	0	1	0	1	0	1	0	0	7
Wichita.....	0	0	—	0	5	0	3	0	0	0	0	—
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	—	0	3	0	1	0	1	0	0	—
Maryland:												
Baltimore.....	2	0	1	0	215	0	7	0	2	0	0	10
Cumberland.....	0	0	—	0	—	0	0	0	0	0	0	—
District of Columbia:												
Washington.....	0	0	—	0	50	2	3	0	3	0	1	3
Virginia:												
Lynchburg.....	0	0	—	0	5	0	1	0	0	0	0	—
Richmond.....	0	0	—	0	3	0	2	0	0	0	0	7
Roanoke.....	0	0	—	0	3	0	0	0	1	0	0	—
West Virginia:												
Charleston.....	0	0	—	0	1	0	0	0	0	0	0	—
Wheeling.....	1	0	—	0	1	0	1	0	0	0	0	7
North Carolina:												
Raleigh.....	0	0	—	0	2	0	0	0	0	0	0	3
Wilmington.....	0	0	—	0	2	0	0	0	0	0	0	1
Winston-Salem.....	0	0	—	0	11	0	1	0	0	0	0	14
South Carolina:												
Charleston.....	0	0	1	0	2	0	0	0	2	0	0	1
Georgia:												
Atlanta.....	1	0	—	0	4	0	1	2	1	0	0	2
Brunswick.....	0	0	—	0	—	0	0	0	0	0	0	—
Savannah.....	0	0	—	0	11	0	3	0	0	0	0	—
Florida:												
Tampa.....	1	0	—	0	3	1	0	6	2	0	2	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	2	0	1	3	4	1	1	0	0	12
Nashville.....	0	0	—	1	—	0	2	0	1	0	0	1
Alabama:												
Birmingham.....	0	0	1	0	2	1	1	0	1	0	1	—
Mobile.....	0	0	—	1	1	0	1	1	0	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	—	0	—	0	0	2	0	0	0	1
Louisiana:												
New Orleans.....	0	0	—	0	3	0	3	5	2	0	0	—
Shreveport.....	0	0	—	0	—	0	3	1	0	0	0	—
Texas:												
Dallas.....	1	0	—	0	5	0	1	7	0	0	0	2
Galveston.....	0	0	—	0	—	0	0	0	0	0	0	1
Houston.....	0	0	—	0	—	0	3	0	1	0	0	2
San Antonio.....	2	0	1	0	2	0	0	3	0	0	0	1
MOUNTAIN												
Montana:												
Billings.....	0	0	—	0	—	0	0	0	0	0	0	—
Great Falls.....	0	0	—	0	17	0	0	0	0	0	0	—
Helena.....	0	0	—	0	—	0	0	0	0	0	0	—
Missoula.....	0	0	—	0	—	0	1	0	0	0	0	—
Idaho:												
Boise.....	0	0	—	0	1	0	0	0	0	0	0	—
Colorado:												
Denver.....	2	0	1	0	—	1	3	20	6	0	0	12
Pueblo.....	0	0	—	0	17	0	0	0	1	0	0	—
Utah:												
Salt Lake City.....	0	0	—	0	13	0	2	1	2	0	0	2

## City reports for week ended July 6, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	15	0	1	1	3	0	0	2
Spokane.....	0	0	-----	0	-----	0	0	0	0	0	0	1
Tacoma.....	0	0	-----	0	6	0	0	0	3	0	0	4
California:												
Los Angeles.....	2	0	4	1	61	1	3	3	8	0	0	2
Sacramento.....	0	0	-----	0	2	0	0	0	0	0	-----	-----
San Francisco.....	1	0	1	0	16	1	1	0	5	0	0	1
Total.....	37	2	20	6	1,543	21	185	98	238	0	21	408
Corresponding week, 1945.....	41	-----	25	8	927	-----	238	-----	349	0	13	642
Average, 1940-45.....	46	-----	24	18	1,591	-----	250	-----	401	1	20	1,023

<sup>1</sup> 3-year average, 1943-45.<sup>2</sup> 5-year median, 1941-45.*Dysentery, amebic.*—Cases: New York 1; Philadelphia 2; Chicago 2; Los Angeles 1.*Dysentery, bacillary.*—Cases: Worcester 1; Providence 3; New York 2; Flint 1; San Antonio 1; Los Angeles 1; San Francisco 1.*Dysentery, unspecified.*—Cases: San Antonio 20.*Rocky Mountain spotted fever.*—Cases: Memphis 2.*Typhus fever, endemic.*—Cases: Raleigh 2; Tampa 1; Mobile 1; New Orleans 4; Galveston 1.

## Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 33,992,900)

	Diphtheria case rates	Enecephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	10.5	0.0	0.0	2.6	690	2.6	47.1	7.8	39	0.0	15.7	139
Middle Atlantic.....	6.9	0.5	2.8	0.5	132	2.8	28.7	3.7	41	0.0	2.3	40
East North Central.....	1.2	0.0	0.6	0.6	289	1.8	25.2	6.5	47	0.0	3.7	91
West North Central.....	6.7	2.2	2.2	0.0	80	2.2	33.4	51.2	27	0.0	0.0	47
South Atlantic.....	3.2	0.0	3.3	0.0	527	4.9	32.8	13.1	20	0.0	4.9	90
East South Central.....	0.0	0.0	17.7	11.8	24	23.6	47.2	11.9	18	0.0	5.9	77
West South Central.....	3.6	0.0	2.9	0.0	29	0.0	28.7	51.7	9	0.0	0.0	20
Mountain.....	15.9	0.0	7.9	0.0	421	7.9	47.7	166.8	71	0.0	0.0	111
Pacific.....	4.7	0.0	7.9	1.6	158	3.2	7.9	6.3	30	0.0	0.0	16
Total.....	5.7	0.3	3.1	0.8	237	3.2	28.6	15.1	37	0.0	3.2	63

## PLAGUE INFECTION IN SAN BERNARDINO, SAN LUIS OBISPO, AND VENTURA COUNTIES, CALIF.

Under date of July 5, 1946, plague infection was reported to have been proved in fleas and tissue from squirrels and in fleas from burrows in California as follows:

*San Bernardino County.*—In 31 fleas from 6 ground squirrels, *Citellus beecheyi fisheri* (*Otospermophilus grammurus fisheri*) taken 7 miles west of Big Bear Lake, received at the laboratory June 3; and proved positive July 3, 1946.

*San Luis Obispo County.*—In 58 fleas from 5 ground squirrels, *C. beecheyi*, taken on a ranch 1 mile north of Pozo, received at the laboratory June 10, and proved positive July 3, 1946; in 223 fleas from burrows on a ranch 2 miles southwest of Santa Margarita, received at the laboratory May 29, and proved positive July 3, 1946.

*Ventura County.*—In 40 fleas from 2 ground squirrels, *C. beecheyi*, and in tissue from 2 ground squirrels, same species, found dead  $\frac{1}{2}$  mile west of Ozena Public Camp. These specimens were received at the laboratory June 3, and proved positive July 3, 1946.

## TERRITORIES AND POSSESSIONS

### Hawaii Territory

*Plague (in ectoparasites).*—Under date of July 3, 1946, plague infection in ectoparasites has been reported in Kahului, Island of Maui, T. H., as follows: In a pool of 50 fleas recovered from rats and mice trapped May 14, 1946, in Districts 14 and 14B, Kaluapulani Gulch, Kahului; also in a pool of 51 fleas from rats trapped May 22, 1946, in District 14, Kahului.

## DEATHS DURING WEEK ENDED JULY 6, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 6, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	7,885	8,637
Average for 3 prior years.....	8,121	
Total deaths, first 27 weeks of year.....	256,410	251,948
Deaths under 1 year of age.....	626	612
Average for 3 prior years.....	569	
Deaths under 1 year of age, first 27 weeks of year.....	16,695	16,476
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67,211,715	67,379,058
Number of death claims.....	9,665	10,386
Death claims per 1,000 policies in force, annual rate.....	7.5	8.0
Death claims per 1,000 policies, first 27 weeks of year, annual rate.....	10.2	10.8

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended June 15, 1946.*—During the week ended June 15, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		56		110	429	29	46	18	135	823
Diphtheria.....		2	3	34	11	1				51
Dysentery, bacillary.....			11	11					6	17
German measles.....				28	28		2	7	5	70
Influenza.....		10			185					195
Measles.....		14	1	407	939	135	20	210	77	1,893
Meningitis, meningococcus.....					1					1
Mumps.....	1	1		39	453	70	49	39	168	820
Polio-myelitis.....				1						1
Scarlet fever.....	1	12	3	89	72	14	1	7	12	211
Tuberculosis (all forms).....		21	2	93	16	23	29	11	27	222
Typhoid and paratyphoid fever.....				13					5	19
Undulant fever.....				1	2					3
Veneral diseases:										
Gonorrhea.....	6	22	11	95	121	45	25	36	77	438
Syphilis.....	6	3	10	119	96	10	12	13	65	334
Whooping cough.....		5		25	119	6		6	1	162

### CUBA

*Habana—Communicable diseases—4 weeks ended June 22, 1946.*—During the 4 weeks ended June 22, 1946, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria.....	3		Polio-myelitis.....	17	1
Malaria.....	1		Tuberculosis.....	4	1
Measles.....	9		Typhoid fever.....	21	1

*Provinces—Notifiable diseases—4 weeks ended June 15, 1946.*—During the 4 weeks ended June 15, 1946, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Río	Habana <sup>1</sup>	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer.....	5	9	16	21	2	10	63
Chickenpox.....		5		1	3	4	13
Diphtheria.....	2	4			2	1	9
Hookworm disease.....		12					12
Leprosy.....		5	4		1	5	15
Malaria.....	6	2		2	3	31	44
Measles.....		10			2		12
Polio-myelitis.....	4	33	10	16	2	4	69
Tuberculosis.....	41	46	42	37	5	56	227
Typhoid fever.....	27	54	12	60	20	67	240
Typhus fever (murine).....		1					1
Undulant fever.....					1		1
Whooping cough.....	1				4	2	7

<sup>1</sup> Includes the city of Habana.

## NORWAY

*Notifiable diseases—March 1946.*—During the month of March 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	25	Mumps.....	211
Diphtheria.....	329	Paratyphoid fever.....	2
Dysentery, unspecified.....	10	Pneumonia.....	3,720
Encephallitis, epidemic.....	2	Polioomyelitis.....	25
Erysipelas.....	405	Rheumatic fever.....	223
Gastroenteritis.....	3,669	Scabies.....	4,986
Gonorrhea.....	643	Scarlet fever.....	549
Hepatitis, epidemic.....	551	Syphilis.....	117
Impetigo contagiosa.....	3,189	Tuberculosiis (all forms).....	434
Influenza.....	21,872	Typhoid fever.....	1
Lymphogranuloma inguinale.....	1	Typhus fever.....	1
Malaria.....	3	Well's disease.....	1
Measles.....	1,276	Whooping cough.....	3,119

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*China.*—Cholera has been reported in China as follows: Amoy, week ended June 8, 1946, 1 fatal case; Canton, June 1–10, 1946, 380 cases, 142 deaths; Hong Kong, weeks ended—June 22, 1946, 75 cases, 23 deaths, June 29, 1946, 53 cases, 25 deaths; Kiangsu Province, June 1–20, 1946, 96 cases, 12 deaths, including 65 cases of suspected cholera.

#### Plague

*China—Fukien Province.*—Plague has been reported in Fukien Province, China, as follows: For the period May 11–20, 1946, 117 cases, 90 deaths; for the period May 21–31, 1946, 118 cases, 62 deaths.

#### Typhus Fever

*Morocco (French).*—For the period June 21–30, 1946, 126 cases of typhus fever were reported in French Morocco, by regions as follows: Agadir and frontier districts, 13; Casablanca, 33; Fez, 21; Marrakech, 25; Meknes, 14; Rabat, 20.

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**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

**G. ST. J. FERROTT, *Chief of Division***

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

**VOLUME 61**

**AUGUST 9, 1946**

**NUMBER 32**

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DDT as a Continuous Larvicide





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# Public Health Reports

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## AN ANALYSIS OF THE DESIGN AND PERFORMANCE OF AIRPLANE EXHAUST GENERATORS FOR THE PRODUCTION OF DDT AEROSOLS FOR THE CONTROL OF *ANOPHELES QUADRIMACULATUS*

By C. W. KRUSÉ and R. L. METCALF, *Health and Safety Department, Tennessee Valley Authority, Wilson Dam, Ala.*

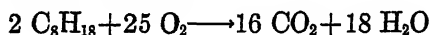
### Introduction

The use of the airplane exhaust generator for the production of DDT aerosols employed in the control of *Anopheles quadrimaculatus* larvae has been extensively studied during the past 2 years. This type of equipment is ideally suited for larvicidal operations on the impounded waters of the Tennessee Valley Authority as it provides a relatively uniform coverage over wide swaths at exceedingly low rates of discharge. The particle size of the larvicide generated may be controlled to meet field requirements. The use of particles of aerosol size will result in the effective penetration of heavy vegetative cover. The visible smoke cloud produced serves as a marker to guide the pilot. The equipment is simple, inexpensive, and easily installed on the 450-hp. 4-DX and 220-hp. PT-17 Stearman biplanes which were available for study. Comparative cost records of the DDT larviciding operation and paris green dusting indicate an approximate cost per acre of \$0.26 for DDT and \$0.79 for paris green, and the DDT treatments resulted in more effective anopheline larvae control. A preliminary account of the development and field testing of this equipment has previously appeared (1), and it is the purpose of this paper to present basic information on the design and performance of the airplane exhaust generator, especially as applied to anopheline larvae control.

## Equipment

Preliminary experiments indicated that the injection of oil solutions of insecticides into the exhaust gas stream of an aircraft engine resulted in the atomization of the solutions and that the drop spectrum obtained was dependent on the controllable factors of: (1) Volume and velocity of exhaust gases, and (2) the rate of liquid injection and the physical properties of the liquid used. Therefore, it follows that accurate measurements of these variables are essential in the design of the equipment.

The volume and velocity of exhaust gases are directly related to the fuel consumption of the engine and to the cross-section area of the exhaust stack at the point of liquid injection. The gas flow can be measured by means of Pitot tube readings provided the exhaust gas temperature and consequent density are known. In order to calculate the velocity, the assumption was made that the exhaust gas consisted largely of nitrogen.<sup>1</sup> In actual practice reliable pitometer readings are difficult to make since investigations should be made in flight. Satisfactory estimates of gas volume have therefore been made from the fuel consumption of the engine, assuming stoichiometric oxidation of octane into carbon dioxide and water vapor which are eliminated in the exhaust with the unburned nitrogen from the air utilized. These volumes were totaled and corrected to the temperature of the exhaust. The equation used was



The amount of nitrogen exhausted was computed from the oxygen required, assuming air to be by weight 23 percent oxygen. A comparison of the results obtained by Pitot measurements and from fuel consumption on the two engines studied is given below.

Aircraft engine	Volume <sup>1</sup> of exhaust gas (cubic feet per second)	
	Computed from fuel consump- tion	Pitometer readings
450-hp. Pratt & Whitney.....	24	20.5-26.4
220-hp. Continental.....	13	10.8-12.0

<sup>1</sup> Engine operating at cruising r.p.m.

The velocity of the exhaust stream may be regulated by varying the cross-sectional area of the exhaust stack. In most instances it is necessary to introduce a venturi constriction to provide the high

<sup>1</sup> At the temperature of the gas measured (1,000° F.), the density of nitrogen is 0.0267 lb. per cubic foot. The Pitot equation, therefore, reduces to: velocity in feet per second = 112 × velocity head in inches H<sub>2</sub>O.

velocities required to break up the desired amount of liquid. The quantity of liquid to be atomized is determined by the required rate of treatment, cruising speed of the aircraft, and the effective swath width obtained.

By plotting the data from a number of experiments where the relative rates of liquid flow and gas flow were correlated with the

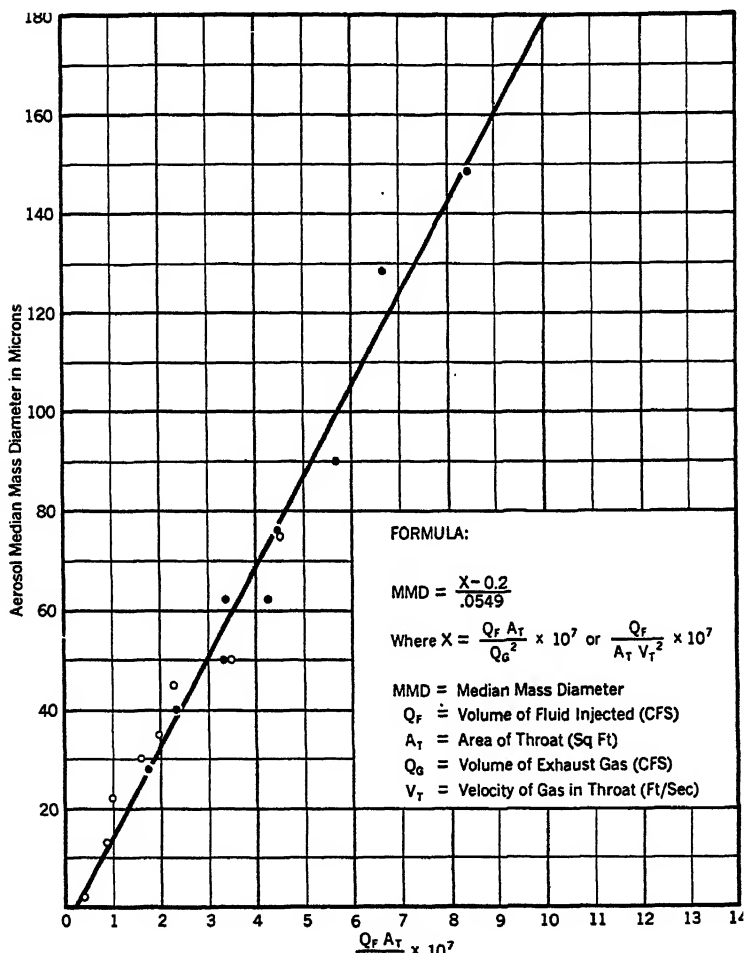


FIGURE 1.—Relationship of mass median diameter to liquid gas flow rates.

mass median diameters of the aerosols produced, it became apparent that a linear relationship existed between these factors. In order to formulate this relationship for purposes of designing exhaust generating equipment, the graph shown in figure 1 was plotted. Thus, with a given volume of fluid injection and a known volume of exhaust gas produced by the engine, the required cross-sectional area of a

venturi throat to produce an aerosol of any desired mass median diameter may be calculated. The empirical equation resulting from this plot is:

$$MMD = \frac{Q_f A_t \times 10^7}{0.0549 (Q_e)^2} - 3.66$$

Where  $MMD$  = Mass median diameter in microns

$Q_f$  = Fluid flow rate in cubic feet per second

$A_t$  = Area of venturi throat in square feet

$Q_e$  = Exhaust gas flow rate in cubic feet per second

This equation was developed from values obtained by the use of a 20 percent solution of technical DDT in Velsicol NR-70 (see Insecticide Formulation, page 1177), and therefore the factors of liquid density, viscosity, and surface tension remain constant under the conditions of the experiment and do not appear in the equation.

Since the completion of this work, Dr. H. F. Johnstone of the University of Illinois kindly called our attention to the fundamental equations of Nukiyama and Tanasawa (2) for the atomization of liquids by gas streams. Using methods of calculation developed by Dr. Johnstone and staff (3), we have made an analysis of our data employing the equations of Nukiyama and Tanasawa which is shown in table 1.

TABLE 1.—Comparison of observed and computed drop sizes obtained with exhaust generators under a variety of operating conditions

Gas flow $Q_e$	Gas velocity $V_e$	Liquid flow $Q_f$	Liquid velocity $V_f$	Observed		Calculated	
				MMD in microns	$D_o$ in microns	MMD (equation 1)	$D_o$ from Japanese equation
21.3	694	0.0029	68.5	40	37	32	21
13.0	596	.00268	63.5	50	44	59	28
33.0	1,075	.00268	63.5	15	16	16	12
21.3	235	.00223	3.8	75	67	84	55

MMD = Mass median diameter in microns.

$D_o$  = Diameter in microns of a single drop with the same ratio of surface area to volume as a representative sample of spray. From the data above, it appears that  $MMD = 1.1 D_o$ .

From the data in table 1 it appears that the agreement between the observed  $D_o$  values and those predicted by the equation of Nukiyama and Tanasawa is relatively good over the entire range of operation of the exhaust generator. In all the plots made of  $D_o$  the value of  $q$  was 1.<sup>2</sup> This confirms the evidence of Lewis et al. (3) who found good

<sup>2</sup>  $q$  represents the relative scattering of drop distribution and a value of 1 indicates a relatively narrow drop spectrum as compared with most atomizing devices.

agreement between observed and calculated  $D_0$  and a value of  $q=1$  for the performance of an exhaust generator on a large military aircraft engine. Thus, it would appear that the large-scale exhaust generator represents a nearly ideal application of the principles of liquid atomization by gases.

Back pressures in exhaust generation equipment should be kept to a minimum to insure adequate power output from the aircraft engine. Generally, the back pressure created is of small consequence and any loss of power is greatly offset by the fact that a lighter load is carried by using DDT insecticide. For example, the Stearman 4-DX, as a duster, carried 1,200 pounds of dust mixture and covered an average of 160 acres per load. With a 20-percent DDT solution only 440 pounds of insecticide is carried with a treatment range of 880 acres which, on the impounded water type of breeding situation, is the limit a pilot can treat without rest. The criteria regarding back pressure are reflected in the cylinder head temperatures of the aircraft engine. The exhaust generator may be considered safe if a 10-minute, full throttle climb during insecticide injection does not produce head temperature beyond the limit set by the engine manufacturers.

Back pressures may be minimized by the proper selection of stack and throat diameters and venturi design. The following design features are desirable:

1. Included angle of entrance cone  $20^\circ$  to  $30^\circ$
2. Included angle of exit cone  $7^\circ$
3. Ratio of throat diameter to exhaust stack diameter 0.25 to 0.50
4. Machined throat surface to insure a smooth union with the entrance and exit cone
5. Length of throat section to be kept at minimum

If the exit cone of the venturi is not shortened, there will be interspersed within the aerosol a few black tarry droplets of very large diameters. It is believed that these droplets are formed by accumulations of aerosol along the walls of the downstream venturi section. Shortening the downstream section to a length equal to five or six times the throat diameter usually eliminates the black droplets without appreciably increasing the back pressure.

Figure 2 shows a typical flow diagram of an airplane equipped with the venturi exhaust generator. The sketch also shows the wing spray equipment which was studied with the aerosol generator. It may be observed that a simple wind-driven pumping unit mounted on the wing discharges the insecticide into the venturi throat by means of two fan-type nozzles.

The rate of discharge is controlled by maintaining a constant pressure on the nozzles by the use of a relief valve and bypass located on

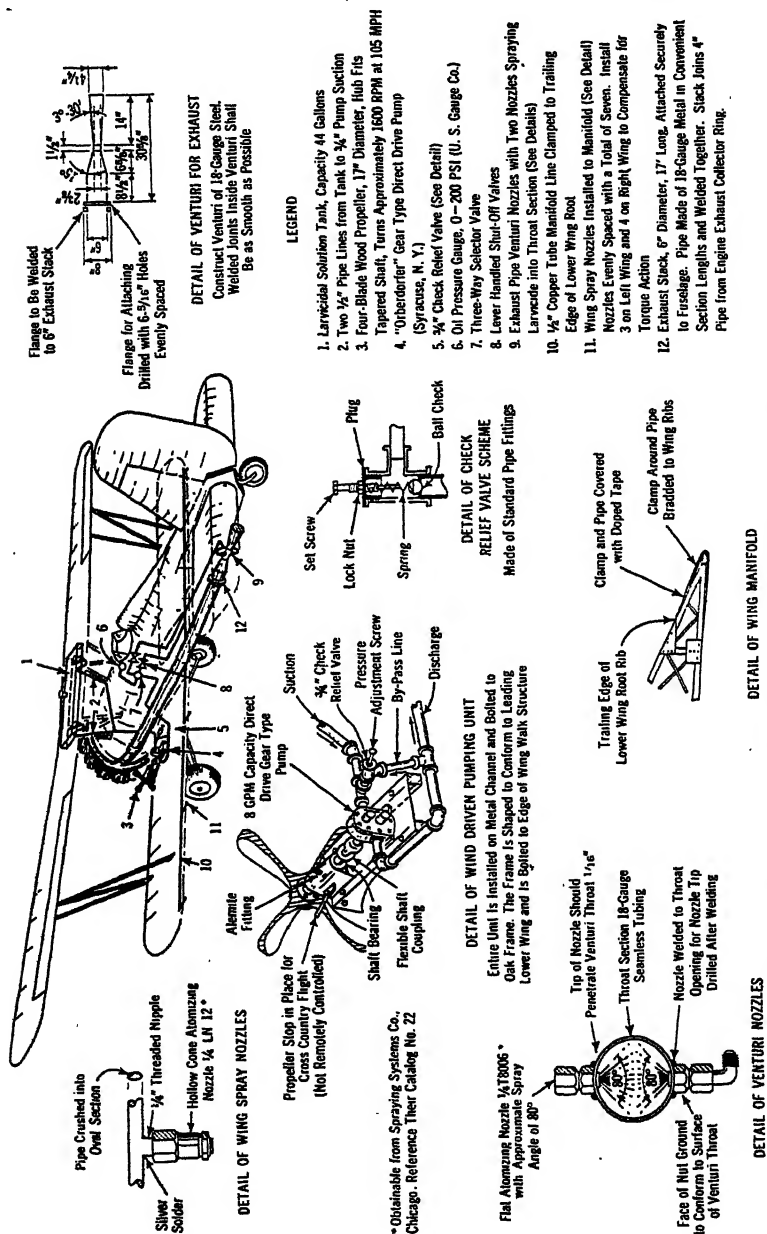


FIGURE 2.—Diagram of an airplane equipped for distribution of liquid larvicides as sprays or as hormonal aerosols.

the pumping unit. The nozzles are calibrated for various pressures, and the discharge rate may be varied by simply adjusting the relief valve to the desired pressure.

On the operation of the exhaust generator, some screening smoke is formed by the evaporation of the polymethyl naphthalene solvent. Chemical analysis of the recovered aerosol has shown a DDT content of 25 percent as compared with 20 percent in the original solution. This is equivalent to the evaporation of about one-fourth of the solvent. No crystals of DDT are formed in the screening smoke, indicating further that the concentration of the DDT in the aerosol remained under the saturation point of DDT. The absence of the characteristic odor of volatilized DDT substantiated this conclusion.

Table 2 presents performance data for two field units developed for anopheline larvae control.

#### Insecticide Formulation

The desirable factors in a DDT solvent for airplane application are: (1) High solvent power to permit the use of concentrated solutions which greatly increase "payload"; (2) low volatility which increases safety factors is desirable for the persistence of the solution on the water surface and decreases solvent evaporation from the hot exhaust gases; and (3) noncorrosive and nonpoisonous chemical properties. After an investigation of commercially available solvents, the methylated naphthalenes were chosen as the most suitable DDT solvents for this purpose. A fraction Velsicol NR-70<sup>3</sup> was readily available which dissolved and maintained stable solutions of 30 to 35 percent technical DDT by weight at room temperature, had a boiling point of 500° to 700° F., and a flash point of 175° F. The vapor pressure of this material ranges from 0.02 cm. mercury at 20° C. to 60 cm. mercury at 300° C. The specific gravity is approximately 1.05 to 1.06 or about 2.3° A. P. I. The technical product consists of at least 70 percent tri-, tetra-, and penta-methylnaphthalenes. The specific heat ranges from 0.31 at 0° F. to 0.68 at 800° F. A 20-percent solution of technical DDT in Velsicol NR-70 was used in all the experiments to be reported. This solution weighed 9.35 pounds per gallon.

#### Field Investigations

In order to determine the most suitable operating conditions, rates of discharge, and particle-size ranges to be employed in anopheline larvicidal operations with the exhaust generator, it was necessary to consider the following factors: (1) Occurrence of narrow, sharply defined breeding areas which necessitated low flight of 20 to 30 feet to insure proper coverage; (2) presence of woody and herbaceous cover through which the larvicide must penetrate to be effective; and (3) presence of many desirable forms of wildlife which must not be injured by the mosquito larvicide. A large number of field tests were carried out to determine the optimum size of aerosol to satisfy these conditions.

<sup>3</sup>Velsicol Corporation, Chicago, Ill.



TABLE 2.—Performance data of airplane exhaust generator for application of DDT Aerosol

Aircraft	Engine  Hp.	Cruising speed  Miles per hour	Acres per minute, 100- ft. swath	Gallons per minute—0.1 lb. DDT <sup>1</sup> per acre <sup>1</sup>	Exhaust velocity		Engine back pressure, inches water		Mass median diameter, microns	
					Stack	Venturi throat	Dry	Fluid injected	Computed	Observed
Stearman 4 DX.....	450	107	22	1.2	107/sec. (8" diam.).....	600/sec. (23½" diam.).....	Inches 6	Inches 11	30	37
Stearman PT-17.....	220	85	17	0.9	105/sec. (4.8" diam.).....	528/sec. (3" diam.).....	9	-----	40	50

<sup>1</sup> 20 percent DDT=80 percent Velsicol NR-70.

### Methods

The basic consideration in the airplane distribution of any particulate material is the swath cross section. The investigations of swath characteristics were made by measuring the ground deposition at sampling points arranged at 20-foot intervals at right angles to the line of flight. Flights were made at a height of 20 to 30 feet, and all the studies were made during the inversion conditions existing just after dawn. When wind drift existed, the aircraft was flown directly into the breeze in order to minimize the effect of this factor on the swath characteristics.

The discharge characteristics of the dispersal equipment were measured by microscopic analysis of the droplets impacted upon clean microscope slides waved in the descending cloud, following the passage of the aircraft, and by the deposition of droplets collected upon slides placed horizontally upon cardboards on the ground or water surface. The former admittedly may not give an entirely satisfactory picture of the composition of the discharge cloud, as very small particles tend to flow around the slide rather than to impact upon it, but in the particle-size range studied, i. e., from 5 to 200 microns diameter, consistent results were obtained. The deposit on the horizontal slides represents precisely the amount of material which will be larvicidally effective.

The quantitative rate of surface recovery was measured by microscopic counting of the drops on a given slide, recording the apparent diameters of the lenses formed; correcting for the spread factor of the 25-percent DDT-Velsicol solution on clean glass, which is 3.3, to convert the lenses to spherical droplets of equivalent volume; and computing from the total weight of DDT collected per slide to the recovery of DDT in pounds per acre. This method is quite precise as it serves to indicate the presence of as small an amount as  $2 \times 10^{-5}$  micrograms of DDT in an area of 3 square inches. It will be noted that all recovery values of DDT solution should be corrected for the increase in DDT content to 25 percent due to volatilization of a portion of the solvent.

The correlation of larvicidal effectiveness with insecticidal deposit was made by using insectary-reared fourth instar *A. quadrimaculatus* larvae in 10-inch paper plates filled with approximately 1 inch of water. Twenty larvae were used in each plate. These plates were shaded after treatment, and mortality data were taken 24 hours after exposure to the insecticide. To avoid contamination, the plates were discarded after each test.

### Properties of Aerosols

An aerosol is defined as a stable suspension of matter in air. Even the smallest liquid particles, however, have a settling velocity in still

air. This velocity can be calculated from Stokes' law which is applicable to the settling rates of spherical particles under 200 microns in diameter in a fluid medium (4). The application of Stokes' law to droplets of DDT-Velsicol NR-70 solution of density 1.12 gm. per cubic centimeter reduces to the expression:

Velocity of settling in feet per minute =  $0.027 (\text{radius in microns})^2$

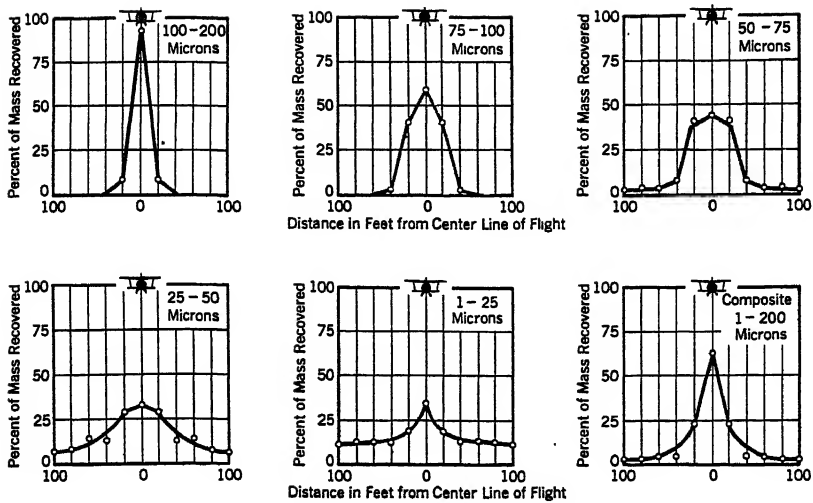
According to these rates of settling, larger particles would be more effective as larvicides as they would be less susceptible to wind drift. However, the air in the wake of an airplane is turbulent and there exists in this region a downdraft which measured for the Stearman 4-DX biplane is approximately 600 feet per minute. This downdraft imparts a settling velocity to the small aerosol droplets which is far in excess of their settling rates in still air, and it is this factor that makes possible the successful larvicidal deposition of fine droplets.

A decided advantage in the use of aerosols for larviciding is the large number of particles formed from the break-up of a given amount of material which results in more even coverage of the water surface. The following tabulation indicates the approximate number of droplets formed from 0.1 lb. of DDT per acre as a 20-percent solution in Velsicol NR-70.

Particle diameter (microns)	Particle weight (micrograms)	Number of particles formed	
		Per acre	Per square centimeter
5	$0.07 \times 10^{-3}$	$2,900 \times 10^9$	72,000
25	$9 \times 10^{-3}$	$23 \times 10^9$	580
50	$70 \times 10^{-3}$	$2.9 \times 10^9$	72
100	$600 \times 10^{-3}$	$.37 \times 10^9$	9

#### *Relation of Particle Size to Aerosol Spread*

Preliminary observations on swath widths obtained with sprays and aerosols from low-flying planes indicated that the smaller the particle size, the wider the swath width. This would be expected owing to the slower subsidence rates of smaller particles which would expose them to the lateral drifting air currents due to the propeller torque for longer periods. This effect has been studied by determining the mass median diameters of particles deposited on microscope slides at 20-foot intervals from the line of flight. The mass median diameter of the aerosol employed was approximately 85 microns. Figure 3 represents the average results of five such tests. The results confirm the theory by showing that the mass median diameter decreases with the distance from the center of flight and indicate the desirability of utilizing particles under 50 microns diameter to obtain satisfactory swath widths and to prevent undue peaking at the center of the swath.



RELATION OF PARTICLE SIZE OF AEROSOL TO SWATH DISTRIBUTION

FIGURE 3.—Swath cross section curves showing the effect of aerosol particle size on the distribution of recovered material.

#### *Relation of Particle Size to Penetration of Plant Cover .*

The relative efficiency of aerosol penetration through plant cover was studied under conditions of still air shortly after dawn. Vegetative cover was arbitrarily classed by visual estimation as low, 0 to 33 percent; medium, 33 to 66 percent; and high, 66 to 100 percent. Flights were made over numbers of slides placed in varying degrees of cover and the rate of recovery and mass median diameters were compared. The results of typical tests are given in table 3.

TABLE 3.—*Penetration of DDT aerosols through plant cover*

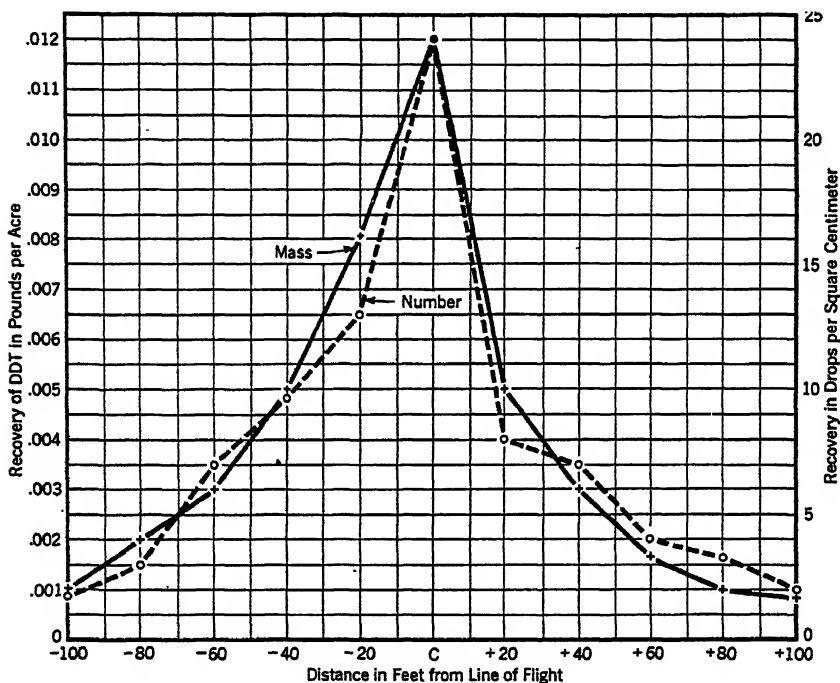
Plant cover	Recovery of aerosol		Mass median diameter of recovery (microns)
	DDT (lbs. per acre)	Drops per cm. <sup>3</sup>	
Herbaceous cover: Rate of discharge 0.1 lb. DDT per acre; height of flight, 30 feet			
Low (open).....	0.0057	12.6	60
Medium.....	.0014	8.3	40
High.....	.0005	5.7	25
Woody cover: Rate of discharge 0.1 lb. DDT per acre; height of flight, 100 feet			
Low (open).....	0.0074	6.7	110
Medium.....	.0044	3.7	90
High.....	.0010	4.0	50

These data offer conclusive evidence that droplets over 50 microns are more readily screened out by vegetation than are smaller droplets. Therefore, it is essential to utilize a discharge of droplets under

50 microns in order to obtain adequate penetration of heavy vegetative cover. This has been repeatedly proved under field test conditions.

#### *Analysis of Swath Cross Section*

The swath cross section is the basic unit in the airplane application of insecticides, and its dimensions under field conditions should be accurately measured. This was done by the use of settling slides as described under "Methods" (page 1179). The rates of aerosol recovery were determined from the slides in pounds of DDT per acre



DISTRIBUTION CURVE OF AEROSOL HAVING A MASS MEDIAN DIAMETER 35-40 MICRONS

FIGURE 4.—Rates of airplane aerosol recovery in pounds DDT per acre and number of drops per square centimeter at a discharge rate of approximately 0.1 pound DDT per acre.

and in number of drops per square centimeter. The average results of seven such tests are given in figure 4. The aerosol studied had a mass median diameter of 35 microns. With such an aerosol having a high degree of homogeneity, the correlation between number of drops and mass deposited is striking as is shown in the figure. The average percent recovery of the aerosol on open-water surface over the 200-foot swath width was 9 percent of the amount discharged. The remainder is impinged on vegetation or drifts away from the treatment area.

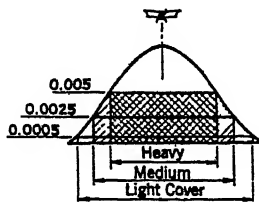
### Toxicity of Aerosol to *A. quadrimaculatus* Larvae

The relation of aerosol deposit to larvicidal action was determined by placing pans of larvae at intervals along the swath cross section and correlating larval kill with DDT dosage determined from slides placed by the pans. The results of seven such tests with the 35-micron mass median diameter aerosol indicated that a deposit of 0.0001 lb. of DDT per acre gives at least 90 percent larval kill in the open. The equivalent of 0.0001 lb. DDT per acre is approximately 1 microgram of DDT per square foot. As this amount of aerosol will kill 90 to 100 percent of 20 fourth-instar larvae in a pan 10 inches in diameter, the  $LD_{90}$  is about 0.025 microgram of DDT per larva. This amount of DDT is represented by an aerosol droplet about 55 microns in diameter. Expressed in terms of body weight, this dose would be equivalent to about 10 micrograms per gram of larval body weight.

### Application of Data to Field Control Work

To apply the analytical data of recovery rates to actual field larviciding practice, the minimum required recovery of 0.0001 lb.

Data Based on Distribution of  
20% DDT - 80% Velsicol Aerosol  
with Mean Mass Diameter  
of 35-40 Microns



Required Recovery of DDT on Open Water Surface in Pounds per Acre To Give 90% Anopheles Larval Kill		
Plant Cover		
Light	Medium	Heavy
0.0005	0.0025	0.005

Swath Treatment	Rate of Discharge of DDT in Pounds per Acre for 100 Swath								
	Light Cover			Medium Cover			Heavy Cover		
	0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2
Width of 90% Larval Kill in Feet									
	180	200	240	65	120	170	10	60	115
	380	410	450	130	240	370	20	120	230
	270	300	335	160	225	270	30	160	215
	230	250	290	110	170	220	55	110	170

FIGURE 5.—Effective swath widths of *Anopheles* larval control with varying rates of treatment and vegetative cover.

DDT per acre was increased by a factor of 5 to allow a margin of safety, giving a required deposit of 0.0005 lb. DDT per acre to insure 90 percent anopheline larval kill in the open. Using the data obtained on aerosol penetration of plant cover, it was determined that five times this amount would be required in the open above medium plant cover to insure 0.0005 lb. per acre on the water surface and that 10 times the minimum amount would be required in heavy plant cover. Thus, the limiting rates of surface recovery necessary per acre to give

90 percent larval kill are: open, 0.0005 lb. DDT; medium cover, 0.0025 lb. DDT; and high cover, 0.005 lb. DDT.

Using these figures in conjunction with the swath cross-sectional recovery curve, figure 5 has been constructed showing the widths of 90 percent larval kill which will be obtained under varying rates of plant cover, aerosol discharge, and flight pattern. This figure represents a practical guide for the field use of the airplane exhaust generator for the control of anopheline larvae.

### Summary and Conclusions

1. A practical airplane unit for the production of DDT aerosols for anopheline larval control has been developed which is simple and inexpensive and can readily be adapted to certain types of available aircraft.

2. The factors determining the particle size of the DDT aerosol produced have been analyzed and formulated for the practical application to the design of equipment. This analysis appears to conform closely to the basic theory of liquid atomization by gas streams.

3. The characteristics of aerosol distribution with regard to swath width, penetration of vegetation, and minimum dosage for larvicidal effectiveness have been analyzed and formulated for field use. These results indicate that aerosols having a mass median diameter between 25 and 50 microns are best suited for the control of *A. quadrimaculatus* larvae under conditions encountered on impounded waters.

### Acknowledgements

The authors are particularly indebted to Dr. H. F. Johnstone and staff of the Department of Chemical Engineering, University of Illinois, for assistance and advice in the development of the exhaust generator and in the analysis of the results obtained. Dr. C. W. Kearns, Department of Entomology, University of Illinois, was also very helpful. Mr. C. C. Kiker and Dr. A. D. Hess and staffs of the engineering and biology sections of the Health and Safety Department, Tennessee Valley Authority, have provided advice and assistance in the course of this study.

### References

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## DDT IN PARADICHLOROBENZENE AS A LARVICIDE <sup>1</sup>

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During the mosquito-producing season of 1945, a series of continuous tests was run to determine whether DDT incorporated in paradichlorobenzene pellets with or without solvents and submerged in a stream would be lethal to *Anopheles* larvae over a period of time.

The stream selected was one with a slow but continuous dry-weather flow; it ranged from 6 to 9 feet in width. The stream itself was free of vegetation, but the banks were overgrown with grass, which offered excellent protection for *Anopheles* larvae. The water surface frequently was covered entirely, or in part, with a thin to moderately thick organic scum, which shifted with the wind. The stream was under observation for many years, and has been consistently a prolific breeding place of *Anopheles* mosquitoes, the larvae being protected by the grassy edges of the stream.

For this study, a portion of the stream was divided into seven connected areas, the length of each section being determined roughly by the configuration of the stream. No. 1, at the upstream end, was 57 feet long by 6 feet average width; No. 2 was 291 feet long by 8 feet average width; No. 3 was 121 feet long by 8 feet average width; No. 4 was 84 feet long by 6 feet average width; No. 5 was 100 feet long by 9 feet average width; No. 6 was 215 feet long by 7 feet average width; No. 7 was 164 feet long by 6 feet average width.

The pellets were prepared by melting the paradichlorobenzene in a Griffin beaker and adding solvents containing DDT and emulsifiers and DDT in crystalline form. To insure even distribution of the DDT, the hot paradichlorobenzene was stirred until the congealing point was reached. Wires were added to the congealing mass for handling purposes. By means of these wires, the pellets were fastened in the water at the upper end of the respective areas close to the banks. Table 1 gives the data pertaining to each pellet.

With two exceptions, all pellets were placed in the stream on June 26, 1945, and were left in place until October 9, 1945. The pellet in area No. 1 was removed on August 28 in order to utilize this area as an additional check on effectiveness, and the pellet in area No. 5 was lost at an undetermined date.

To compare *Anopheles* larvae production in treated and untreated waters, an area was selected upstream, above the treated section, and, after August 28, area No. 1 was also utilized as an untreated comparison area.

<sup>1</sup> From the Office of Malaria Investigations of the National Institute of Health, Memphis, Tenn.; and Office of Malaria Control in War Areas, States Relations Division, Atlanta, Ga.



TABLE 1.—Data on treated pellets

Area No.	Pellet as prepared	Weight when placed, in grams	Weight when removed, in grams	Percent disintegrated
1	475 cc. paradichlorobenzene..... 25 cc. of a 7-percent solution DDT in No. 10 motor oil..... 20 gm. DDT..... 12 cc. Triton X-100.....	478	( <sup>1</sup> )	-----
2	475 cc. paradichlorobenzene..... 25 cc. of 50-percent solution DDT in Velsicol 70 plus 1.5 percent Triton X-100..... 20 gm. DDT.....	555	395	30.0
3	475 cc. paradichlorobenzene..... 25 cc. of 50-percent solution DDT in Velsicol 70 plus 0.5 percent Triton X-100..... 20 gm. DDT.....	545	322	41.0
4	475 cc. paradichlorobenzene..... 25 cc. of a 7-percent solution of DDT in No. 10 motor oil..... 20 gm. DDT.....	408	281	31.0
5	550 cc. paradichlorobenzene..... 50 cc. of a 7-percent solution of DDT in No. 10 motor oil..... 20 gm. DDT.....	557	Lost	-----
6	475 cc. paradichlorobenzene..... 25 cc. of a 7-percent solution of DDT in No. 10 motor oil..... 20 gm. DDT.....	421	322	23.5
7	575 cc. paradichlorobenzene..... 25 cc. of a 7-percent solution of DDT in No. 10 motor oil..... 10 cc. Triton X-100..... 20 gm. DDT.....	565	287	49.0

<sup>1</sup> Damaged at removal Aug. 28.

Examination of the study areas for *Anopheles* production was made at intervals during the season. Table 2 gives the record of dippings made for this purpose.

TABLE 2.—Dipping records

Date	Average number of <i>Anopheles</i> larvae per dip										Remarks
	Number dips per area	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Average, areas 1-7	Untreated areas	
1945											
June 25.....	15	3.00	1.20	1.20	3.50	2.20	2.10	2.40	2.23	0.60	Untreated
June 29.....	25	1.30	.45	.08	0	0	.50	.50	.40	7.30	Treated 1-7
July 16.....	13	.43	.13	.25	.25	.90	( <sup>2</sup> )	0	.33	.64	Treated 1-7
July 20.....	15	.04	.85	.80	1.50	.13	.75	0	.52	3.20	Treated 1-7
Aug. 6.....	14	1.10	.65	1.00	2.00	.10	.50	.30	.81	3.50	Treated 1-7
Aug. 10.....	11	1.50	.60	1.20	1.90	.75	.60	.42	.97	4.00	Treated 1-7
Aug. 18.....	12	.38	1.10	.60	.75	.26	.43	( <sup>2</sup> )	.50	1.40	Treated 1-7
Sept. 4.....	13	3.30	.85	1.50	2.20	2.20	.80	.60	1.36	( <sup>2</sup> )	Treated 2-7
Sept. 21.....	20	1.70	.90	.80	.30	.25	.30	( <sup>2</sup> )	.51	( <sup>2</sup> )	Treated 2-7

<sup>1</sup> Treatment pellet removed from area No. 1 on August 28. This area used thereafter as a comparison or untreated area. Prompt resumption of *Anopheles* production should be noted.

<sup>2</sup> Lack of a record in certain areas due to conditions beyond control, usually development of rainy weather.

Figure 1 is included to show the *Anopheles* larvae rates in treated and untreated areas. The curves show the average number of larvae per dip for the treated and untreated areas.

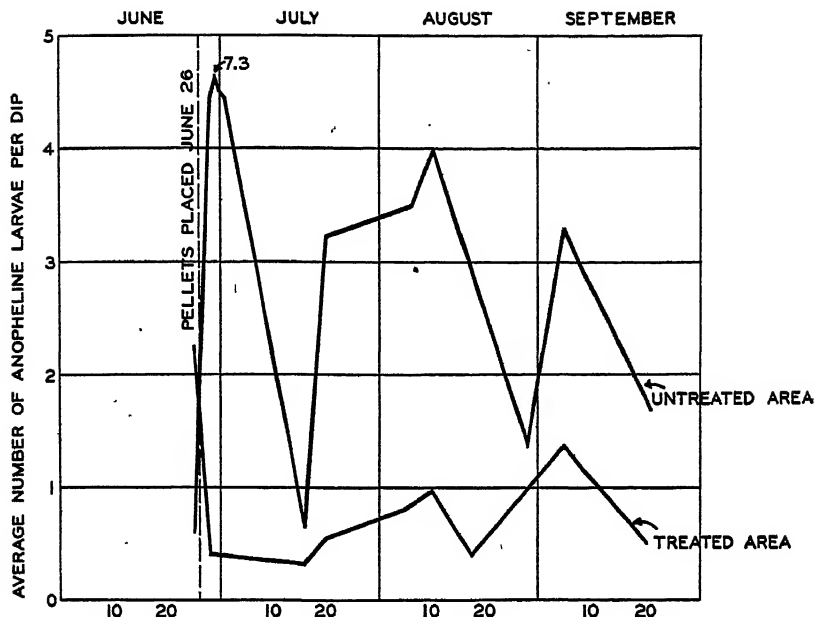


FIGURE 1.

The experiments were purely qualitative rather than quantitative. Consequently, definite figures are not quoted to indicate results achieved. It is apparent from the data presented that notwithstanding the unusual and frequent summer rains, a material reduction in *Anopheles* larvae was noted in the treated areas during the entire season, following the introduction of the pellets.

There is a notable rise in the number of *Anopheles* larvae present during the period August 6 to 10 in the treated areas, whereas the number of larvae in the untreated area did not show this rise to the same degree. The increase is attributable in part at least to rains.

Undoubtedly, the quantity of DDT dispensed by the pellets per unit of water area was very small, as evidenced by the fact that the pellets disintegrated less than 50 percent of their volume after a period of 3½ months. While the reduction in larvae was marked, up to a period of at least 6 weeks, changes caused by rains or scum growth materially influenced the results secured. In some instances, grass growing out into the stream completely buried the pellets in a mass of turf. They had to be freed in order to make them more effective.

As in previous experiments, it was noted repeatedly that where the surface scum had been blown away by the wind and the water surface left clean, the DDT was much more effective in preventing *Anopheles* production along the adjacent grass-lined banks.

It is probable that the amount of DDT dispensed was insufficient to secure the most effective control. The results obtained, however, indicate the practicability of liberating DDT continuously as a means of preventing the development of *Anopheles* larvae. By increasing the rate of disintegration of the pellets, a higher degree of *Anopheles* control might be expected.

## PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

June 16-July 13, 1946

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended July 13, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941-45.

### DISEASES ABOVE MEDIAN PREVALENCE

*Poliomyelitis*.—The number of cases of poliomyelitis rose from 568 during the 4 weeks ended June 15 to 1,214 during the 4 weeks ended July 13. The number of cases was 1.8 times the 1941-45 median which was represented by the 1945 incidence (678 cases). The current incidence was higher than in 1945 in all but 2 of the 9 geographic regions and higher than the 1941-45 median in all sections. Of the total cases Texas reported 195, Florida 111, Colorado 89, California 82, Minnesota 71, Illinois 66, Alabama 61, Louisiana 53, Arkansas and Oklahoma 40 cases each—two-thirds of the cases occurred in these 9 States. While there has been a sharp rise in the number of cases of this disease in a few States in other sections, the current epidemic has been confined largely to Southern and Western States. Since the preceding 5-year medians in many sections fell within an epidemic year, it is significant that the current incidence in each section was considerably higher than the median. Since the beginning of the year there have been 2,587 cases reported as compared with 1,674, 1,796, and 1,626 cases for the same period in 1945, 1944, and 1943, respectively, 3 successive years of above normal expectancy. In Florida where the disease first appeared in epidemic form, the number of cases (111) for the current 4 weeks was the same as in the preceding 4-week period, while in Texas and Colorado the largest numbers of weekly cases were reported during the current 4-week

*Number of reported cases of 9 communicable diseases in the United States during the 4-week period June 16–July 13, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941–45*

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	845	770	623	2,171	2,545	2,545	39,747	12,009	23,046
New England.....	30	25	15	5	75	5	7,244	1,440	3,180
Middle Atlantic.....	133	70	75	21	18	18	12,332	2,303	4,581
East North Central.....	100	108	100	57	62	101	7,734	2,476	4,007
West North Central.....	85	72	57	15	37	37	1,102	479	1,263
South Atlantic.....	189	109	93	706	573	581	4,057	283	1,719
East South Central.....	68	58	46	83	58	70	707	172	238
West South Central.....	120	161	112	1,156	1,468	1,118	1,958	943	943
Mountain.....	47	46	42	88	194	199	1,172	723	978
Pacific.....	73	121	100	40	60	109	3,443	3,191	3,191
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States.....	311	502	502	1,214	678	678	4,602	6,494	5,053
New England.....	11	25	41	15	25	10	398	622	622
Middle Atlantic.....	76	98	98	67	128	33	1,578	1,755	1,237
East North Central.....	48	114	114	126	50	35	1,182	1,710	1,412
West North Central.....	31	34	34	186	21	21	263	514	345
South Atlantic.....	35	60	60	171	105	105	295	476	279
East South Central.....	31	51	43	107	87	87	101	169	162
West South Central.....	33	52	50	328	187	73	119	232	152
Mountain.....	7	10	10	114	6	12	222	183	183
Pacific.....	39	58	53	100	69	50	443	833	502
	Smallpox			Typhoid and paratyphoid fever			Whooping cough <sup>2</sup>		
United States.....	20	18	24	470	498	618	7,995	10,251	13,933
New England.....	0	0	0	46	12	21	784	937	937
Middle Atlantic.....	1	0	0	40	40	56	1,316	2,614	2,640
East North Central.....	7	6	10	63	53	67	1,789	1,398	3,182
West North Central.....	2	6	8	35	12	24	387	285	665
South Atlantic.....	0	0	1	88	140	140	1,537	1,987	1,987
East South Central.....	3	1	6	43	74	99	311	398	581
West South Central.....	6	4	4	124	127	149	1,072	1,079	1,096
Mountain.....	1	1	1	15	28	28	344	398	525
Pacific.....	0	0	2	16	12	19	455	1,155	1,155

<sup>1</sup> Mississippi and New York excluded; New York City included.

<sup>2</sup> Mississippi excluded.

period; in Texas the cases rose from 123 for the preceding 4-week period to 195 for the 4 weeks ended July 13, and in Colorado there were 89 cases as compared with 23 during the preceding 4-week period. The 1945 epidemic first appeared in Texas and spread rapidly into all sections of the country; in 1944 the first rise occurred in North Carolina and later appeared in the northeastern section of the country, approximately one-third of the cases occurring in New York City. In 1943 the disease was most prevalent in the Pacific States and the southwestern part of the country.

**Diphtheria.**—For the 4 weeks ended July 13 there were 845 cases of diphtheria reported, the number being about 10 percent above that reported for the corresponding period in 1945 and about 35 percent

above the 1941-45 median. In the East North Central and Mountain sections the incidence was about normal and in the Pacific section the number of cases was only about 70 percent of the median expectancy, but in the other 6 sections the increases ranged from 1.1 times the median in the West South Central section to twice the median in both the New England and South Atlantic sections.

*Measles*.—For the country as a whole the incidence of measles was the highest reported for this season of the year since 1941 when approximately 45,000 cases were reported for the corresponding 4 weeks. The number of cases (39,747) reported for the current 4 weeks was 3.3 times the incidence in 1945 and 1.7 times the 1941-45 median for the corresponding 4 weeks. While each section of the country except the West North Central reported a relatively high incidence, the largest increases over the normal seasonal expectancy were reported from the Atlantic Coast and East South Central sections.

#### DISEASES BELOW MEDIAN PREVALENCE

*Influenza*.—For the 4 weeks ended July 13 there were 2,171 cases of influenza reported. The number was about 85 percent of the 1941-45 median, which was represented by the 1945 incidence (2,545 cases). The number of cases in the South Atlantic section was about 20 percent above the 5-year median, but in other sections the incidence either closely approximated the median or fell considerably below it.

*Meningococcus meningitis*.—During the 4 weeks ended July 13 there were 311 cases of meningococcus meningitis reported. The preceding 5-year median for these same weeks was 502 cases. Each section shared in the decline of this disease. For the country as a whole the current incidence was the lowest since 1942. While this disease is experiencing a gradual decline since the 1942-44 epidemics, the number of cases is still high compared with the incidence in normal and minor epidemic years.

*Scarlet fever*.—The number of cases (4,602) of scarlet fever was about 70 percent of the 1945 incidence for the corresponding 4 weeks and 90 percent of the 1941-45 median. The Middle Atlantic, South Atlantic, and Mountain sections reported excesses over the median, but all other sections reported a relatively low incidence.

*Smallpox*.—The smallpox incidence was about normal, 20 cases being reported for the current 4-week period as compared with 18 for the corresponding period in 1945 and a 1941-45 median of 24 cases. One case was reported from New York, which is the first case reported from the North Atlantic section during the corresponding period since 1939, when 6 cases occurred in Connecticut.

*Typhoid and paratyphoid fever*.—The number of cases (470) of these

diseases was lower than the number reported for the corresponding period in 1945 and only about 75 percent of the 1941-45 median. The numbers of cases in the New England and West North Central sections were higher than the normal seasonal expectancy, but in other sections the incidence either closely approximated the median or fell considerably below it.

*Whooping cough.*—For the current 4-week period there were 7,995 cases of whooping cough reported, as compared with 10,251 for the corresponding period in 1945 and a 1941-45 median of 13,933 cases. For the country as a whole the current incidence was the lowest for this period in the 9 years for which these data are available. The incidence was considerably below the median expectancy in all sections of the country.

#### MORTALITY, ALL CAUSES

For the 4 weeks ended July 13 there were 33,840 deaths from all causes reported to the Bureau of the Census by 93 large cities. The preceding 3-year average for the corresponding weeks was 34,322 deaths. The number of deaths was lower than the preceding 3-year average in each of the first 3 weeks of the 4-week period but during the fourth week the number was about 4.5 percent higher than the 1943-45 average.

#### INCIDENCE OF HOSPITALIZATION, JUNE 1946

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country, mostly in large cities.

Item	June	
	1946	1945
1. Number of plans supplying data.....	81	81
2. Number of persons eligible for hospital care.....	20,475,364	18,151,008
3. Number of persons admitted for hospital care.....	202,351	182,128
4. Incidence per 1,000 persons, annual rate during current month (daily rate × 365).....	120.3	122.1
5. Incidence per 1,000 persons, annual rate for the 12 months ended June 30, 1946.....	108.7	104.7
6. Number of plans reporting on hospital days.....	29	31
7. Days of hospital care per case discharged during month <sup>1</sup> .....	8.08	8.05

<sup>1</sup> Days include entire stay of patient in hospital whether at full pay or at a discount.

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED JULY 20, 1946

#### Summary

Increases in the incidence of poliomyelitis occurred in all of the 9 geographic divisions, but were slight in the South Atlantic, West South Central, and Pacific areas, and in the New England area, with the exception of New Hampshire. A total of 668 cases was reported for the week, as compared with 427 last week, a 5-year median of 329, and 568 (the largest number previously recorded for a corresponding week) for the week in 1944. In the 21 States reporting more than 6 cases and showing increases, 561 cases were reported, as compared with 301 for the preceding week. Probably the most significant increases occurred in New Hampshire (4 to 12), Pennsylvania (1 to 9), Illinois (23 to 42), Minnesota (40 to 97), Missouri (14 to 34), South Dakota (5 to 11), Nebraska (12 to 20), Kansas (18 to 35), Alabama (14 to 33), Mississippi (6 to 19), Louisiana (18 to 27), Colorado (31 to 43), New Mexico (1 to 12), Arizona (1 to 9), and California (25 to 38). Decreases were recorded in Michigan (11 to 7), Arkansas (20 to 15), and Oklahoma (15 to 6). Ohio and Florida reported the same numbers as for the preceding week (13 and 24, respectively). The total to date is 3,262, as compared with 2,048 for the period last year, 2,320 in 1944, and 2,923 in 1934, which was the highest number recorded for the corresponding period of any previous year of record (weekly figures not available for 1916).

Of the total of 44 cases of infectious encephalitis, as compared with 17 last week, Texas reported 11 and California 21. The cumulative total is 304, as compared with 205 for the same period last year and an average of 280 for the corresponding periods of the past 4 years.

Deaths recorded during the week in 93 large cities of the United States totaled 8,093, as compared with 8,770 last week, 7,698 and 7,783, respectively, for the same weeks in 1945 and 1944, and a 3-year (1943-45) average of 7,924. The total for the year to date is 273,272, as compared with 267,820 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended July 30, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	July 20, 1946	July 21, 1945		July 20, 1946	July 21, 1945		July 20, 1946	July 21, 1945		July 20, 1946	July 21, 1945	
NEW ENGLAND												
Maine.....	2	0	0	—	—	—	28	1	26	0	0	0
New Hampshire.....	0	0	0	—	—	—	4	1	5	0	0	0
Vermont.....	0	0	0	—	—	—	62	5	25	0	0	0
Massachusetts.....	14	0	2	—	—	—	405	142	185	0	2	2
Rhode Island.....	1	0	0	—	—	—	20	3	13	0	2	2
Connecticut.....	1	0	0	—	—	—	122	22	69	3	2	2
MIDDLE ATLANTIC												
New York.....	14	7	7	14	12	12	589	70	184	12	13	13
New Jersey.....	5	3	2	3	1	2	275	34	122	3	3	3
Pennsylvania.....	1	3	5	2	—	—	223	111	111	1	4	4
EAST NORTH CENTRAL												
Ohio.....	1	5	5	—	3	5	340	12	73	2	2	2
Indiana.....	0	4	4	—	2	3	16	3	14	0	3	2
Illinois.....	2	3	9	2	4	4	86	178	106	6	5	5
Michigan <sup>1</sup> .....	13	15	3	6	1	1	205	100	105	3	4	4
Wisconsin.....	4	4	1	9	19	9	300	45	280	0	4	1
WEST NORTH CENTRAL												
Minnesota.....	3	6	3	—	—	—	21	2	33	3	3	0
Iowa.....	4	1	1	—	—	—	29	12	30	1	0	0
Missouri.....	2	4	4	1	1	—	14	17	17	2	9	3
North Dakota.....	0	1	1	—	11	—	4	3	8	0	0	0
South Dakota.....	0	1	1	—	—	—	3	3	7	0	1	1
Nebraska.....	0	3	1	—	1	3	11	3	7	0	0	0
Kansas.....	4	3	1	1	1	1	11	9	23	0	1	0
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	4	3	2	0	0	0
Maryland <sup>1</sup> .....	3	0	0	3	4	1	158	8	15	2	4	5
District of Columbia.....	0	0	0	—	—	—	24	—	9	0	0	0
Virginia.....	15	4	4	65	68	38	122	4	30	0	1	7
West Virginia.....	2	3	3	—	19	1	9	2	14	1	0	0
North Carolina.....	1	6	6	—	—	—	35	5	37	3	4	4
South Carolina.....	7	9	5	73	58	87	34	4	16	0	1	1
Georgia.....	3	6	4	3	6	8	21	3	10	0	1	1
Florida.....	14	5	4	2	—	4	14	—	10	2	2	1
EAST SOUTH CENTRAL												
Kentucky.....	4	2	2	1	—	—	102	7	13	2	5	2
Tennessee.....	2	4	3	3	5	8	23	6	16	2	8	3
Alabama.....	4	3	3	7	14	12	24	4	12	1	4	4
Mississippi <sup>1</sup> .....	1	5	3	—	—	—	—	—	—	1	1	0
WEST SOUTH CENTRAL												
Arkansas.....	1	3	3	2	4	5	10	8	21	2	2	2
Louisiana.....	17	10	5	5	2	2	13	5	5	7	3	2
Oklahoma.....	2	1	2	1	19	4	10	3	9	2	1	1
Texas.....	29	35	23	246	330	231	176	81	101	12	1	3
MOUNTAIN												
Montana.....	2	1	0	—	—	—	22	7	7	0	1	0
Idaho.....	1	1	0	4	10	—	5	12	4	1	0	0
Wyoming.....	0	2	0	—	—	—	10	8	8	0	0	0
Colorado.....	8	2	3	1	3	3	24	9	9	1	0	0
New Mexico.....	2	3	1	—	3	1	22	3	8	0	0	0
Arizona.....	13	1	0	8	19	19	40	1	12	0	0	0
Utah <sup>1</sup> .....	0	0	0	—	—	—	50	100	33	0	0	0
Nevada.....	0	0	0	—	—	—	1	1	5	0	1	0
PACIFIC												
Washington.....	5	1	1	—	1	—	28	93	61	2	2	2
Oregon.....	3	7	1	—	2	5	59	26	32	0	1	1
California.....	33	21	13	4	2	3	246	352	352	12	13	11
Total.....	243	198	154	456	615	584	4,054	1,586	2,739	89	114	114
29 weeks.....	9,068	7,318	6,765	189,664	68,307	79,477	630,726	97,111	528,294	4,199	5,770	5,770

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.



*Telegraphic morbidity reports from State health officers for the week ended July 20, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.*

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median, 1941-45	Week ended—		Median, 1941-45	Week ended—		Median, 1941-45	Week ended—		Median, 1941-45
	July 20 1946	July 21 1945		July 20 1946	July 21 1945		July 20 1946	July 21 1945		July 20 1946	July 21 1945	
	1946	1945		1946	1945		1946	1945		1946	1945	
NEW ENGLAND												
Maine.....	1	3	0	2	2	6	0	0	0	1	2	0
New Hampshire.....	12	4	0	0	0	0	0	0	0	0	0	0
Vermont.....	2	2	0	0	7	2	0	0	0	1	0	0
Massachusetts.....	1	14	3	30	62	62	0	0	0	2	2	2
Rhode Island.....	0	0	0	4	1	1	0	0	0	0	0	0
Connecticut.....	4	3	0	9	15	12	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York.....	22	46	10	72	98	79	0	0	0	6	5	8
New Jersey.....	8	37	5	32	28	19	0	0	0	1	2	2
Pennsylvania.....	9	12	6	45	67	43	0	0	0	2	10	6
EAST NORTH CENTRAL												
Ohio.....	13	8	2	55	54	51	0	0	0	5	1	8
Indiana.....	5	2	2	5	14	10	1	0	0	4	2	2
Illinois.....	42	6	7	33	69	43	0	0	0	3	2	4
Michigan <sup>2</sup> .....	7	3	6	46	64	48	0	0	1	0	7	7
Wisconsin.....	4	0	0	22	40	37	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	97	0	0	10	23	27	0	0	0	0	0	0
Iowa.....	13	1	1	3	14	8	1	0	0	0	0	0
Missouri.....	34	4	3	5	17	12	0	0	0	0	8	5
North Dakota.....	3	0	1	1	3	2	0	0	0	0	0	0
South Dakota.....	11	0	0	3	3	5	0	0	0	0	0	0
Nebraska.....	20	1	1	4	11	4	0	0	0	0	0	0
Kansas.....	35	8	5	16	37	10	0	1	0	1	0	1
SOUTH ATLANTIC												
Delaware.....	0	2	0	0	1	1	0	0	0	1	0	0
Maryland <sup>2</sup> .....	3	6	4	5	19	19	0	0	0	0	0	3
District of Columbia.....	0	9	1	1	4	3	0	0	0	0	0	0
Virginia.....	4	28	3	23	16	4	0	0	0	11	5	5
West Virginia.....	4	1	1	29	19	19	0	0	0	4	1	8
North Carolina.....	3	3	3	10	14	10	0	0	0	3	2	6
South Carolina.....	0	12	4	2	2	2	0	0	0	5	2	8
Georgia.....	3	5	5	3	7	11	0	0	0	1	11	14
Florida.....	24	2	2	5	2	2	0	0	0	1	1	1
EAST SOUTH CENTRAL												
Kentucky.....	7	3	4	2	21	15	0	0	0	2	8	9
Tennessee.....	0	20	11	6	12	14	0	0	0	3	6	9
Alabama.....	33	3	3	16	5	8	0	0	0	3	3	8
Mississippi <sup>2</sup> .....	19	0	5	0	5	3	0	0	0	2	4	5
WEST SOUTH CENTRAL												
Arkansas.....	15	3	3	3	4	4	0	0	0	12	2	9
Louisiana.....	27	4	4	10	3	3	0	0	0	12	12	13
Oklahoma.....	6	9	4	3	9	9	0	0	0	1	4	4
Texas.....	61	62	9	24	34	18	0	0	0	13	20	25
MOUNTAIN												
Montana.....	2	0	0	2	2	4	0	0	0	0	0	1
Idaho.....	1	0	0	2	8	4	0	0	0	2	0	0
Wyoming.....	8	0	0	3	1	2	0	0	0	0	0	0
Colorado.....	43	2	0	14	11	9	0	0	0	0	1	1
New Mexico.....	12	0	1	5	13	1	0	0	0	1	2	3
Arizona.....	9	0	0	3	2	2	0	0	0	2	0	0
Utah <sup>2</sup> .....	0	11	0	11	11	7	0	0	0	0	1	1
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	2	4	1	18	12	12	0	0	0	0	0	1
Oregon.....	1	1	3	19	9	4	0	0	0	0	0	1
California.....	38	25	11	70	121	87	0	0	0	3	2	4
Total.....	668	369	329	686	996	807	2	1	5	109	129	264
29 weeks.....	3,262	2,048	1,955	84,478	131,162	94,785	266	255	596	1,936	2,133	2,684

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 2; New York 1; New Jersey 1; Indiana 1; Illinois 1; Virginia 1; Arkansas 4; Louisiana 2; California 2.

Telegraphic morbidity reports from State health officers for the week ended July 20, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended July 20, 1946								
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever	
	July 20, 1946	July 21, 1945		Ame- bic	Bacil- lary	Un- spec- ified						
NEW ENGLAND												
Maine	1	67	28									
New Hampshire	2	9	4									
Vermont	29	15	15								1	
Massachusetts	156	141	141		2						1	
Rhode Island	9	4	22									
Connecticut	36	25	38		2						3	
MIDDLE ATLANTIC												
New York	121	302	291	3	6		1	1		1	7	
New Jersey	148	253	184			2		4			3	
Pennsylvania	104	196	255					2			2	
EAST NORTH CENTRAL												
Ohio	96	186	186								3	
Indiana	21	29	29	1					1		7	
Illinois	145	91	158	3			3	5			9	
Michigan <sup>1</sup>	214	165	170		1		1				5	
Wisconsin	180	50	161				1		1		6	
WEST NORTH CENTRAL												
Minnesota	11	11	43	2							2	
Iowa	21	8	30				1		1		3	
Missouri	11	40	40								8	
North Dakota		2	6									
South Dakota	1		4								1	
Nebraska	2	2	9									
Kansas	31	39	58								18	
SOUTH ATLANTIC												
Delaware	6		1									
Maryland <sup>1</sup>	14	83	103			1		3				
District of Columbia	4	10	10									
Virginia	79	89	89			134		6		2	2	
West Virginia	17	79	32					1				
North Carolina	118	206	206					7		7	1	
South Carolina	35	82	106	5	17					1	2	
Georgia	7	14	28					3		24	3	
Florida	41	20	19				2			7		
EAST SOUTH CENTRAL												
Kentucky	71	61	61				1	3				
Tennessee	17	15	34	8	1	1		2			2	
Alabama	26	29	29	1				2		22	2	
Mississippi <sup>1</sup>									1	3		
WEST SOUTH CENTRAL												
Arkansas	1	15	23	7	3		2		8	3	6	
Louisiana	8	6	7	2						20	2	
Oklahoma	11	11	11					1				
Texas	221	147	190	27	428	28	11			45	30	
MOUNTAIN												
Montana	3	7	27									
Idaho	21	14	6	1		2					1	
Wyoming	3	2	4						1			
Colorado	15	45	21		1							
New Mexico	33	7	7									
Arizona	5	15	19			29	1					
Utah <sup>1</sup>	16	37	66		1				1		5	
Nevada			1									
PACIFIC												
Washington	36	36	49									
Oregon	25	19	19								1	
California	73	240	240	3	1		21		1	1	4	
Total	2,245	2,924	3,439	63	467	198	44	40	15	134	140	
Same week, 1945	3,439			111	615	333	11	27	16	164	123	
Average, 1943-45	3,166			91	645	389	13	4 27	15	4 141		
29 weeks: 1946	55,284			1,634	10,013	3,722	304	260	546	1,069	2,777	
1945	73,290			1,045	13,607	3,876	205	231	456	1,986	2,729	
Average, 1943-45	81,873		109,174	1,035	11,023	3,642	288	4 262	445	4 1,638		

<sup>1</sup> Period ended earlier than Saturday.

<sup>4</sup> 5-year median, 1941-45.

Leprosy: Illinois 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended July 13, 1946

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	36	0	3	0	0	0	0	-----
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Massachusetts:												
Boston.....	1	0	-----	0	84	2	3	0	6	0	0	23
Fall River.....	0	0	-----	0	12	0	0	0	0	0	0	-----
Springfield.....	0	0	-----	0	30	0	0	0	3	0	1	1
Worcester.....	0	0	-----	0	98	0	3	0	0	0	0	38
Rhode Island:												
Providence.....	0	0	-----	0	43	0	1	0	6	0	0	16
Connecticut:												
Bridgeport.....	0	0	-----	0	-----	0	1	0	0	0	0	1
Hartford.....	0	0	-----	0	7	0	1	0	0	0	0	2
New Haven.....	0	0	-----	0	17	1	0	0	1	0	0	-----
MIDDLE ATLANTIC *												
New York:												
Buffalo.....	1	0	-----	0	6	0	3	0	1	0	0	3
New York.....	7	1	-----	1	193	3	42	7	41	0	3	34
Rochester.....	0	0	-----	0	4	0	2	1	2	0	0	2
Syracuse.....	0	0	-----	0	1	0	0	1	8	0	0	2
New Jersey:												
Camden.....	0	0	-----	0	1	0	0	1	0	0	0	1
Newark.....	0	0	-----	0	25	2	2	0	3	0	0	21
Trenton.....	0	0	-----	0	19	0	1	0	2	0	0	1
Pennsylvania:												
Philadelphia.....	2	0	1	0	15	3	16	0	12	0	1	24
Pittsburgh.....	0	0	-----	0	15	0	1	1	3	0	0	6
Reading.....	0	0	-----	0	2	0	1	0	0	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0	-----	1	3	2	3	0	5	0	0	10
Cleveland.....	1	0	-----	0	189	0	5	5	7	0	0	19
Columbus.....	0	0	-----	0	3	0	1	0	1	0	0	2
Indiana:												
Fort Wayne.....	0	0	-----	0	1	0	0	0	1	0	1	-----
Indianapolis.....	1	0	-----	0	3	0	5	0	4	0	0	14
South Bend.....	0	0	-----	0	1	0	0	0	0	0	0	-----
Terre Haute.....	0	0	-----	0	3	0	0	0	0	0	0	-----
Illinois:												
Chicago.....	2	0	-----	0	31	2	22	9	19	0	1	50
Springfield.....	0	0	-----	0	-----	0	2	0	1	0	0	-----
Michigan:												
Detroit.....	2	0	-----	0	13	1	7	3	17	0	0	74
Flint.....	0	0	-----	0	1	0	1	0	1	0	0	-----
Grand Rapids.....	1	0	-----	0	6	0	0	0	1	0	0	5
Wisconsin:												
Kenosha.....	0	0	-----	0	18	0	0	2	2	0	0	-----
Milwaukee.....	2	0	-----	0	25	0	4	0	1	0	0	70
Racine.....	0	0	-----	0	87	0	0	0	0	0	0	-----
Superior.....	0	0	-----	0	1	0	0	0	0	0	0	18
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	-----	0	-----	1	0	0	1	0	0	1
Minneapolis.....	1	0	-----	0	6	0	7	23	5	0	0	-----
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	1	2	2	0	0	5
St. Joseph.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
St. Louis.....	0	0	1	0	17	1	6	4	1	0	0	5

## City reports for week ended July 13, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollionmyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0	-----	0	1	0	1	*10	1	0	0	-----
Kansas:												
Topeka.....	0	0	-----	0	2	0	2	2	2	0	0	8
Wichita.....	0	0	-----	0	3	1	2	3	0	0	0	5
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	1	0	0	0	0	0	0	1
Maryland:												
Baltimore.....	6	0	-----	1	164	0	4	0	3	0	0	24
Cumberland.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Frederick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	1	0	-----	0	24	1	3	1	2	0	0	21
Virginia:												
Lynchburg.....	0	0	-----	0	7	0	0	0	1	0	0	-----
Richmond.....	0	0	-----	0	6	0	1	1	1	0	0	5
Roanoke.....	0	0	-----	0	1	0	0	0	1	0	0	1
West Virginia:												
Charleston.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Wheeling.....	0	0	-----	0	-----	0	0	0	0	0	0	8
North Carolina:												
Raleigh.....	0	0	-----	0	2	0	0	0	0	0	1	6
Wilmington.....	0	0	-----	0	3	0	2	0	0	0	0	-----
Winston-Salem.....	0	0	-----	0	4	0	0	0	0	0	0	23
South Carolina:												
Charleston.....	0	0	-----	0	1	0	1	0	0	0	0	1
Georgia:												
Atlanta.....	0	0	-----	0	8	0	2	1	0	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Savannah.....	0	0	1	0	2	0	0	0	1	0	0	-----
Florida:												
Tampa.....	4	0	-----	0	2	0	2	4	1	0	0	3
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	1	4	1	3	0	5	2	1	0	2	5
Nashville.....	0	0	-----	0	1	0	1	0	0	0	1	-----
Alabama:												
Birmingham.....	1	0	-----	0	1	0	1	3	0	0	0	-----
Mobile.....	1	0	-----	0	-----	1	0	2	0	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	-----	0	0	5	1	0	0	-----
Louisiana:												
New Orleans.....	0	0	2	1	2	1	6	20	2	0	0	-----
Shreveport.....	0	0	-----	0	-----	0	0	3	0	0	1	-----
Texas:												
Dallas.....	0	0	-----	0	1	0	1	6	1	0	1	-----
Galveston.....	4	0	-----	1	-----	0	0	1	0	0	0	-----
Houston.....	1	0	-----	0	1	1	2	0	2	0	0	-----
San Antonio.....	0	0	-----	0	-----	0	9	5	0	0	1	3
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	10	0	2	0	0	0	0	-----
Great Falls.....	0	0	-----	0	9	0	1	0	0	0	0	-----
Helena.....	0	0	-----	0	1	0	0	0	0	0	0	-----
Missoula.....	2	0	-----	0	1	0	0	1	0	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Colorado:												
Denver.....	1	0	-----	0	13	0	2	14	3	9	0	14
Pueblo.....	0	0	-----	0	16	0	0	0	2	0	0	-----
Utah:												
Salt Lake City.....	0	0	-----	0	12	0	3	0	3	0	0	-----

\*Including 7 nonresident cases.

## City reports for week ended July 13, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	13	0	3	3	1	0	0	8
Spokane.....	0	0	-----	0	5	0	1	0	1	0	0	-----
Tacoma.....	0	0	-----	0		0	0	0	2	0	0	6
California:												
Los Angeles.....	1	0	3	0	75	2	6	8	8	0	0	3
Sacramento.....	1	0	-----	0	1	1	0	1	0	0	0	-----
San Francisco.....	0	0	1	0	32	1	7	0	4	0	0	3
Total.....	45	2	13	6	1,444	27	217	155	204	0	14	604
Corresponding week, 1945.....	63	-----	10	6	827	-----	242	-----	301	0	12	888
Average, 1941-45.....	43	-----	22	17	1,117	-----	240	-----	314	0	22	1,060

1 3-year average, 1943-45.

2 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: New York 2; Chicago 1; St. Louis 1; San Francisco 1.*Dysentery, bacillary.*—Cases: Worcester 3; New York 1; Rochester 1; Chicago 1; Charleston, S. C., 2; San Antonio 1; Los Angeles 1.*Dysentery, unspecified.*—Cases: San Antonio 13.*Leprosy.*—Cases: New Orleans 1.*Rocky Mountain spotted fever.*—Cases: Philadelphia 2.*Tularemia.*—Cases: Great Falls 1.*Typhus fever, endemic.*—Cases: Chicago 1; Winston-Salem 1; Tampa 3; Birmingham 2; Mobile 2; New Orleans 2; Houston 2; Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1943, 34,088,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	2.6	0.0	0.0	0.0	855	7.8	31.4	0.0	42	0.0	2.6	212
Middle Atlantic.....	4.6	0.5	0.5	0.5	130	2.7	31.5	5.1	33	0.0	1.9	45
East North Central.....	5.5	0.0	0.0	0.6	234	3.0	30.4	11.6	86	0.0	1.2	159
West North Central.....	2.3	0.0	2.3	0.0	65	6.8	45.1	99.2	27	0.0	0.0	54
South Atlantic.....	18.0	0.0	1.6	1.6	368	1.6	24.5	11.4	21	0.0	1.6	152
East South Central.....	17.7	5.9	23.6	5.9	30	5.9	41.3	41.3	6	0.0	17.7	80
West South Central.....	14.3	0.0	5.7	5.7	11	5.7	51.7	114.8	17	0.0	8.6	9
Mountain.....	23.8	0.0	0.0	0.0	492	0.0	79.4	119.1	64	0.0	0.0	127
Pacific.....	2.2	0.0	6.3	0.0	199	6.3	26.9	19.0	25	0.0	0.0	36
Total.....	6.9	0.3	2.0	0.9	221	4.1	33.3	23.8	31	0.0	2.1	93

## PLAGUE INFECTION IN SAN LUIS OBISPO COUNTY, CALIF., AND KLAMATH COUNTY, OREG.

## CALIFORNIA

Under date of July 11, plague infection was reported in San Luis Obispo County, Calif., as follows: In a pool of 136 fleas from burrows in the Salinas Dam Area, 7½ miles east of Santa Margarita (Pozo Road). Specimens were received at the laboratory on May 29 and proved positive on July 9.

## OREGON

Under date of July 12, plague infection was reported in Klamath County, Oregon, as follows: In a pool of 4 fleas from 8 ground squirrels, *C. oregonus*, collected on June 27, in a locality 5 to 10 miles southwest of Klamath Falls, and proved positive on July 12. This locality borders on Siskiyou County, Calif., where 4 human cases of plague, with 3 deaths, occurred during the years 1941-43, and plague infection was subsequently found in ground squirrels taken in several scattered localities of the county.

## TERRITORIES AND POSSESSIONS

## Hawaii Territory

*Plague (in ectoparasites).*—Plague infection in ectoparasites has been reported on the Island of Maui, T. H., under date of July 17, 1946, as follows: One lot of 48 fleas recovered from 22 rats trapped May 24, 1946, in Kailua Gulch, District 16, Makawao District; one lot of 56 fleas recovered from 33 rats trapped May 24, 1946, District 14, Kahului, Makawao District.

\* \* \*

## DEATHS DURING WEEK ENDED JULY 13, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 13, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	8, 770	8, 174
Average for 3 prior years.....	8, 392	
Total deaths, first 28 weeks of year.....	265, 179	260, 122
Deaths under 1 year of age.....	750	612
Average for 3 prior years.....	612	
Deaths under 1 year of age, first 28 weeks of year.....	17, 445	17, 088
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67, 231, 494	67, 323, 083
Number of death claims.....	11, 331	12, 746
Death claims per 1,000 policies in force, annual rate.....	8. 8	8. 9
Death claims per 1,000 policies, first 28 weeks of year, annual rate.....	10. 1	10. 7

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended June 22, 1946.*—During the week ended June 22, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		53		54	357	27	43	32	117	683
Diphtheria.....		2	2	32	8	2			2	48
Encephalitis, infectious.....						1				1
German measles.....		1		25	21	1	1	6	5	60
Measles.....		40	5	283	504	216	16	326	33	1,423
Meningitis, meningococcus.....				1	1					2
Mumps.....		2	1	16	264	55	30	27	142	537
Poliomyelitis.....					2				1	3
Scarlet fever.....	2	8	2	66	36	11		13	7	145
Tuberculosis (all forms).....		16	2	144	83	12	15	19		291
Typhoid and paratyphoid fever.....				7	3				8	13
Undulant fever.....		1			1			1		3
Venereal diseases:										
Gonorrhea.....	4	18	11	92	162	46	44	45	96	518
Syphilis.....	1	10	5	54	90	11	11	13	39	234
Other forms.....				1					2	3
Whooping cough.....				107	72	1		17		197

### NEW ZEALAND

*Notifiable diseases—4 weeks ended May 18, 1946.*—During the 4 weeks ended May 18, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis.....	16	3	Poliomyelitis.....	15	2
Diphtheria.....	257	11	Puerperal fever.....	8	
Dysentery:			Scarlet fever.....	137	
Amebic.....	7		Tetanus.....	7	6
Bacillary.....	14		Trachoma.....	1	
Erysipelas.....	26	1	Tuberculosis (all forms).....	196	50
Food poisoning.....	13		Typhoid fever.....	23	
Malaria.....	11		Undulant fever.....	2	

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*China*.—Cholera has been reported in China as follows: Kwangsi Province—May 11–31, 1946, 189 cases, 27 deaths; Kwangtung Province—Canton—June 11–20, 1946, 317 cases, 105 deaths; Shanghai—June 21–30, 1946, 488 cases, 29 deaths.

*Indochina (French)—Cambodia*.—For the month of June 1946, 162 cases of cholera were reported in Cambodia, French Indochina. For the week ended June 29, 1946, 2 cases of cholera were reported in Pnom-Penh, Cambodia.

*Japan—Formosa*.—For the month of April 1946, 15 cases of cholera with 5 deaths were reported in Keelung, and 33 cases of cholera with 23 deaths were reported in Tainan, Formosa, Japan.

*Malay States (Unfederated)*.—Cholera has been reported in the Malay States (Unfederated) as follows: Kelantan, weeks ended—July 6, 1946, 72 cases, 59 deaths; July 13, 1946, 34 cases, 25 deaths; Trengganu, week ended July 6, 1946, 3 cases, 1 death.

*Manchuria*.—Under date of July 20, 1946, 312 deaths from cholera were reported in various localities in Manchuria, including Mukden, where 27 cases of cholera with 7 deaths were reported up to July 18, 1946.

### Plague

*Canada—Nova Scotia—Cape Breton Island—Sydney*.—On July 9, 1946, 1 imported suspected case of plague was reported in Sydney, Cape Breton Island, Nova Scotia, Canada.

*China*.—Plague has been reported in China as follows: May 21–31, 1946, Kwangtung Province, 16 cases, 10 deaths; June 1–10, 1946, Chekiang Province, 17 cases, 3 deaths; Fukien Province, 151 cases, 61 deaths, including 131 cases, with 48 deaths in Foochow.

*Ecuador—Chimborazo Province—Avinag*.—During the month of June 1946, 2 cases of plague with 1 death were reported in Avinag, Chimborazo Province, Ecuador.

*Egypt—Matariya*.—During the week ended July 6, 1946, 2 cases of plague were reported in Matariya, Egypt.

*Indochina (French)—Cochinchina*.—For the month of June 1946, 2 cases of plague were reported in Cochinchina, French Indochina.



**Smallpox**

*Indochina (French)-Cambodia.*—For the month of June 1946, 467 cases of smallpox were reported in Cambodia, French Indochina.

**Typhus Fever**

*Ecuador.*—For the month of June 1946, 133 cases of typhus fever with 8 deaths, were reported in Ecuador. Provinces reporting the highest incidence are: Tungurahua, 40 cases; Chimborazo, 21 cases; Carchi, 20 cases; Bolivar, 16 cases.

**Yellow Fever**

*Ivory Coast—Bobo Diulasso.*—On July 17, 1946, 1 case of suspected yellow fever was reported in Bobo Diulasso, Ivory Coast.

*Nigeria—Oyo Province.*—For the week ended May 25, 1946, 1 fatal case of yellow fever was reported in Oyo Province, the location not specified. On July 1, 1946, 2 cases of suspected yellow fever with 1 death were reported in Oshogbo, Oyo Province, Nigeria.

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FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

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# Public Health Reports

**VOLUME 61**

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**NUMBER 33**

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# Public Health Reports

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## THE UNITED STATES PUBLIC HEALTH SERVICE COMMUNICABLE DISEASE CENTER<sup>1</sup>

By JUSTIN M. ANDREWS, *Senior Scientist (R), United States Public Health Service*

The Communicable Disease Center of the United States Public Health Service was inaugurated officially on July 1, 1946, for the field investigation and control of communicable diseases. The Center, located in Atlanta, Ga., will continue certain training and investigation functions of the Office of Malaria Control in War Areas, which it replaces, and in addition will deal with special phases of communicable disease prevention not now provided as Federal services.

While the majority of the infections to be encompassed by the Center for the present occur either exclusively or more intensively in the Tropics or subtropics and are transmitted by insects, the feature truly common to the proposed group is that the etiologic agent, vector, or reservoir of infection is known or suspected to be zoological. This would include all diseases of protozoan and helminthic origin, the most prominent of which are malaria, amebiasis, the schistosomiasis, hookworm disease, filariasis, etc., and certain infections of bacterial or viral etiology such as yellow fever, dengue, certain neurovirologic disorders, the various forms of typhus and plague, sand-fly fever, diverse diarrheas and dysenteries, and possibly other diseases. While such a consolidation may be considered heterogeneous from clinical and nosologic points of view, it is eminently sound, sensible, and workable from the standpoints of laboratory diagnosis, epidemiologic investigation, and control operations.

The consequences of negligence and disregard in these matters reveal themselves in such episodes as the following:

In 1930, *Anopheles gambiae* was discovered to have invaded Brazil, presumably from West Africa. Before this vicious malaria vector had been exterminated in 1942, thousands of persons had died of malaria, hundreds of thousands had been

<sup>1</sup> From the Communicable Disease Center, States Relations Division.

incapacitated temporarily by it, and millions of dollars had been spent in its control—and all because of the importation of a foreign vector of disease.

In 1933, this country was confronted suddenly with a Nation-wide epidemic of amebic disease originating in Chicago. Physicians, laboratorians, and health engineers were totally unprepared to cope with it, and unnecessary losses of life and health resulted.

The onset of World War II found the United States Army virtually without personnel skilled in the diagnosis, management, and prevention of such diseases as malaria, dengue, schistosomiasis, filariasis, Japanese B., encephalitis, etc. It was necessary to rob Federal and State health services for cadres in these specialties—and these nuclei were pitifully small and all too few.

Insofar as such situations are preventable, they should not be allowed to develop. The best way to forestall them is to foster training, investigations, and control technology as continuing and permanent elements under Federal auspices.

In meeting these problems, practicing physicians and local health departments will constitute the main line of defense. Upon them will fall the task of recognizing and treating tropical and related infections and of instituting local preventive and suppressive measures to preclude the spread of these diseases. But these hazards have certain extraterritorial and interstate aspects which make them matters of Federal concern as well. It is the responsibility of the United States Public Health Service to assist in the sensitization of local medical and health practitioners so that they will remain alert to alien disease hazards, and to provide for the States the specialized assistance not otherwise available for the control of these diseases. The proposed Center will furnish these aids in addition to conducting essential research and developing new equipment, materials, and techniques.

Aside from the administrative mechanism necessary for the existence of such an organization, its functional development can be summarized under three categories corresponding, respectively, to the types of services rendered. Many of these are already established under the auspices of MCWA.

### *I. Training and Training-Aid Production*

*In-service.*—Employees entering the Center, either as commissioned officers or civil servants will continue to receive orientation training in respect to the United States Public Health Service and the Communicable Disease Center. Specialized technical instruction is given in the units to which trainees are detailed.

*Special.*—Training in effective control practices for special diseases, such as malaria, typhus, plague, etc., is being offered to representatives of State and local health departments and to those of other Federal agencies concerned in the prevention of these diseases. Similarly, courses in the laboratory diagnosis of infections not now endemic in all parts of the country but which may be introduced by returning overseas servicemen or as a result of global air transportation are being given to technicians from public health and clinical laboratories.

*Vocational health training.*—CDC is to establish a pattern for vocational health training which, presumably, will be carried on in various regionalized centers throughout the country. This activity is already under way. It includes orientation in public health viewpoints, definition of Federal, State, and local

public health relationships, basic field training in public health practices, observation of all types of local health department activities and actual work participation by trainees in the field of their own specialties under training supervisors.

It is not intended for this venture to infringe in any way upon the prerogatives or fields of endeavor of schools or teaching departments of public health, hygiene, or preventive medicine. Rather, the objective is to offer additional, practical training opportunities to inexperienced graduates of such organizations on the one hand and, on the other, training to subprofessional public health workers whose educational backgrounds deny them entrance to schools of hygiene and public health.

*Professional information and training aids.*—This is essentially a medical and scientific information service concentrating, for the present, in the field of tropical, insect-borne, and related diseases. Physicians and technicians interested in the recognition of these infections, either clinically or in the laboratory, may receive technical information concerning the diagnosis of these diseases and, if they request it, advice as to the most readily available facilities for assistance or consultation.

Abstracts of articles, reprints, charts, exhibits, illustrated printed materials, lantern slides, film strips, and moving pictures are being produced and distributed:

1. To physicians and scientists to aid in presenting their experiences and researches before professional gatherings.
2. To medical, public health, engineering, and laboratory schools to assist in teaching.

The production and distribution of information and teaching materials, especially audio-visual training aids, will probably become one of the major functions of the Center. There appears to be no more dependable or cheaper method of stimulating or improving the instruction concerning communicable disease and its control. It is not planned to engage in lay health education activities.

## ***II. Epidemiologic and Laboratory Services***

*Emergency epidemic aid.*—Facilities for meeting requests for Federal assistance in analyzing and advising in regard to epidemic phenomena will be maintained.

*Disease control evaluation.*—Studies of morbidity and mortality rates are being made to measure the effectiveness of specific measures, especially of new and improved ones, employed in the control of tropical and related diseases.

*Instructional.*—Members of the laboratory staff serve as teachers for technician training.

*Laboratory services.*—The laboratory will provide the microscopic, cultural, and serological services necessary for epidemiologic and control analysis. To meet the requirements of rapid field diagnosis under epidemic conditions, mobile laboratory facilities are available. Efforts are being made to develop standardized laboratory techniques to be used for survey purposes so that the data collected at different times and places may have a greater degree of comparability than at present. It should be emphasized that these services are concerned primarily with the application and field phases of communicable disease investigations and not with the establishment of new facts in the realm of pure science.

*Evaluation and consultation.*—In compliance with the expressed desire of State health laboratory chiefs, efforts are under way to evaluate techniques and practices employed in public health and, as requested, in clinical laboratories in the diagnosis of the diseases dealt with by the Communicable Disease Center. Ultimately this activity may be extended—it is sorely needed—into the fields of biochemistry, hematology, etc., as well as microscopy and cultural and serological techniques.

In connection with evaluation services and in response to specific requests, laboratory personnel may be sent to State and local health laboratories for the



purpose of solving technical and administrative problems or of improving substandard techniques and practices. It is hoped that advice may be offered also regarding the design and construction of regional or branch public health laboratories.

*Extension.*—State and local health laboratories are being provided with various series of protozoologic, helminthic, bacteriologic, entomologic, and other specimens to assist in the training of technicians, as a reference museum, and for circulation to local clinical laboratories.

### III. Operational Services

*Emergency epidemic control assistance.*—As the neurovirological diseases assume a constantly greater importance and as some of these have been shown to be transmitted by insects, it is likely that the United States Public Health Service may be called upon to provide emergency suppressive measures against these as well as other insect-borne diseases. It is proposed that the necessary equipment and materials for such purposes be stock-piled and that a cadre of trained operatives, regularly employed on other operational details, be kept available for use in dealing with these situations.

*Endemic disease control.*—As a major and continuing activity of the operational organization of the Communicable Disease Center, it is planned that demonstrations of insect-borne endemic disease control be undertaken in strategic areas. This project is already under way in MCWA and will continue in the Center as model or demonstration malaria, murine typhus, dengue, filariasis, schistosomiasis, or other control programs established in places where justification for such operations is based upon high disease rates and assurance that preventive measures will be carried on by local authorities after the demonstration phase has been concluded by the Center.

*Field testing.*—The facilities of the Communicable Disease Center provide excellent opportunities for the controlled field testing on a large scale of new or improved materials and equipment designed for communicable disease control.

*Impoundment malaria control.*—In the past, MCWA engineers have functioned to assist other Federal agencies by making surveys and submitting reports, including recommendations, regarding impoundment construction and maintenance for the purpose of minimizing malaria hazards. This service has been rendered in conjunction with the public health engineers of the States concerned.

Similarly, MCWA engineers have assisted certain State health departments in formulating impounded-water regulations and have thus been in position to set high standards for the design, construction, and maintenance of these structures as far as malaria control is concerned.

These advisory and service functions in connection with impounded water will be continued by the Center and to them will be added investigation activities necessary for the improvement of malaria control practice in impoundments.

*Evaluation of vector control.*—The results of disease control efficiency are frequently attested more promptly by reduction in vector densities than in specific disease prevalence. Thus it is desirable for operational control groups to have quantitative methods available for the enumeration of vectorial populations as control activities proceed. Such investigations will be maintained in the Center.

*Equipment design and testing.*—Control measures, especially against insect- and arthropod-borne diseases, tend to become more and more mechanized. The present activities of MCWA in designing new control equipment and in testing both new and old will be continued in the Center.

*Insecticide and rodenticide research.*—The advent of DDT wrote a new chapter in the history of insect control, yet the surface of this important subject is barely scratched. Already isomers of DDT are being subjected to laboratory and field

testing and other entirely new types of allegedly insecticidal compounds are available for investigation. Similarly, in rodent control, the development of ANTU and sodium fluoroacetate offer new and unexplored horizons in the reduction of rodent populations. Studies in the laboratory and in the field will continue with the objects of improving and defining the limits of current and new methods of poisoning vectors and lower animal reservoirs of disease.

*Related biological studies.*—The use of insecticides, larvicides, and rodenticides is attended by certain hazards to living creatures other than disease-transmitting insects and rodents. Extensive drainage interferes with the propagation of aquatic and semiaquatic forms of life of concern to nature lovers and sportsmen. It behooves the professional sanitarian to keep himself well informed regarding these dangers and to take every precaution consistent with health objectives to avoid interference with wildlife and agricultural interests. In order to provide first-hand knowledge concerning the harmful effects of control practices on the biological associates of vectors and reservoirs of disease, critical ecological studies have been initiated in MCWA. These will be continued and expanded under the aegis of the Communicable Disease Center.

These are the functions to be undertaken by the Communicable Disease Center. Collectively, they exceed the resources and facilities of individual States. They are concerned to a large degree with interstate and extracontinental health hazards. They can be most economically and effectively administered by a single, coordinated agency, as the supporting activities necessary for the productive conduct of the operations indicated above utilize common and interchangeable personnel and equipment.

The scope and magnitude of this enterprise remain to be defined by future events. It is hoped earnestly that the peacetime Communicable Disease Center will merit and receive the support and co-operation of State health departments to the same or even greater extent than did the war-related Office of Malaria Control in War Areas.

#### Malaria Control in War Areas

As noted above, the Communicable Disease Center replaces the Office of Malaria Control in War Areas and continues certain of its functions. This office was established shortly after the Pearl Harbor episode as the result of negotiations between the War Department and the Federal Security Agency. Its program, developed initially under the direction of Dr. L. L. Williams, Jr., was a cooperative undertaking by the United States Public Health Service and various State health departments.

In 1942 and 1943, the war emphasis was on mobilization, training, and production of military necessities. This involved mass migration of war workers and inductees, many of them to the South where the climate was favorable for year-round training but where malaria was or had been endemic. The introduction of large numbers of susceptibles into areas where occasional gametocyte carriers still could be found, where effective anophelism and temperatures favorable for

anopheline infection existed, created a potential malaria problem of national significance.

The primary aim of MCWA during these 2 years was to prevent or reduce malaria transmission around Army, Navy, and essential war industry areas by extending the control operations carried on by military authorities within these reservations. This involved not only the utilization of appropriate antilarval techniques but the institution of community educational programs and the evaluation of control progress in terms of parasite prevalence and anopheline density. Environmental operations were commenced in 15 southeastern States and Puerto Rico but were extended later to four more States, including some on the west coast, the District of Columbia, the Territory of Hawaii, and British Jamaica. Specific insect control measures were beamed not only at anophelines but at the dengue-carrying *Aedes aegypti* and, in cooperation with the Bureau of Entomology and Plant Quarantine, at the vicious dog fly on Florida beaches.

In 1944, the numbers of overseas casualties and prisoners of war evacuated to the United States rose to new heights. Many of these individuals had contracted malaria in service. Hospitals and detention camps in which they were confined were scattered throughout the country thus adding to malaria potentials in endemic areas and creating new ones in marginal sections where conditions for the existence of malaria were present but in which the disease had not been endemic for many years. The facilities of the MCWA extra-cantonmental program were brought into play against this hazard in the endemic situations; in the marginal ones, it was met by commissioning mobile malaria control units which covered circuits of military installations in Northern and Western States and effectively reduced adjacent anopheline breeding.

By 1945, service men were returning to the 48 States in ever increasing numbers. Upwards of half a million of them had contracted malaria overseas and the majority of these had been infected with *Plasmodium vivax*, a parasite species notable for its recurrent and treatment-resisting characteristics. While the armed forces would not release men known to be infected with *vivax* malaria, there was no way of ascertaining that parasites had disappeared completely save by long, continued observation, a procedure which was incompatible with the strong insistence of the American public for the speedy discharge of its veterans. The diffusion of these occasional carriers throughout the land added new possibilities to the national malaria problem. Its significance was admittedly indeterminate but it certainly could not be ignored by public health authorities. To meet this added threat, the so-called extended program of MCWA was activated, based on the premise that imported malaria would be most likely to establish itself in areas where conditions for transmission were ideal, that is, where they are or have been recently opera-

tive. Thus, in important malarious foci, drainage and larviciding activities were intensified by MCWA and upon these reductive measures was superimposed that mighty instrument of insect destruction, residual DDT application on domestic premises. During this same year, 1945, endemic typhus control around areas of military importance was added to the MCWA program.

The returning overseas veteran was a potential carrier not only of malaria but of numerous other infections, many of which are unknown in all or certain parts of the United States. While service men and women benefit by every preventive technique and therapeutic measure known to science before they are discharged or separated from active service, it seemed probable that overt cases of malaria, filariasis, schistosomiasis, leishmaniasis, oriental hookworm infestation, and possibly other parasitoses acquired overseas might present themselves to practitioners in any State in the Union. Special facilities were established, therefore, to aid physicians and medical technicians in the diagnosis of tropical and parasitic diseases and in the recognition of their etiologic agents.

This incomplete works catalogue fails to portray a comprehensive picture of MCWA activities. To support the huge operational program, training, evaluation, and research were necessary.

The bulk of expenditures—some 70 to 80 percent—has gone for personal services, i. e., labor. These workers numbered upwards of 4,000 at certain seasons of the war years. Together with their supervisors, they had to be recruited largely from personnel ineligible for military service. As the vast majority of technical and professional Americans customarily concerned with insect control and related activities had been absorbed by the Army and the Navy, MCWA was forced to utilize inexperienced and untrained work supervisors and technical directors. To instruct these individuals in the principles and practices of insect and rodent control, a large in-service training program was instituted, and to do it quickly audio-visual teaching methods and materials were employed. Since the materials available were inadequate in scope and quality it was necessary to produce new ones. For the guidance and evaluation of MCWA operations, epidemiologic, entomologic, parasitologic, and technologic field and laboratory facilities of considerable magnitudes were maintained. This has involved the collection, staining, and examination of thousands of thick blood films, the regular searching for and counting of anophelines and aedines, adult and larval, from a wide range of resting and breeding places, and the development of improved methods and equipment for the application of insecticides and rodenticides.

Special investigations of operational significance have been or are being carried on in association with the National Institute of Health

of the United States Public Health Service, the Health and Safety Division of the Tennessee Valley Authority, the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture, and various university and State health departments. Research subjects include the determination of whether or not foreign strains of malaria parasites are readily transmitted by native vectors, epidemiologic and entomologic evaluation of DDT domestic spray applications as used by MCWA, reasons for occasional failures of DDT as a residual larvicide, the design and testing of hand and power spray equipment, the insecticidal durability of DDT under various conditions and on various surfaces, improvement in aerial methods of dispersing DDT, anopheline host-preference studies, the effect of rat-flea destruction on human typhus prevalence, the significance of flies in the transmission of diarrheal diseases, and many others.

With the inactivation in 1945 and 1946 of numerous military establishments in this country and the rapid demobilization of the armed forces, the MCWA extracantonment program of malaria control is being rapidly liquidated. After this year, it will remain only in such areas as have been specially requested by the Army and where State and local health resources are inadequate to supply the services required. The extended program will be continued for one or two more years.

Thus the war-connected operations of MCWA are rapidly diminishing as, indeed, they should. The basic organization, however, of physicians, engineers, and biologists skilled and experienced in the control of insect- and rodent-borne diseases remains and, in the opinion of many, should be continued (1) as a safeguard against a recurrence of that unfortunate state of affairs which prevailed in 1942 when this Nation could not find enough competent malaria control teams to service the Army and the Navy overseas and to protect the health of its civilians at home, (2) as a prevention against the establishment of exotic infections introduced into this country by returning veterans, occupational troops or as a result of constantly increasing global air traffic, and (3) to combat certain endemic infections, notably murine typhus, sylvatic plague, and insect-borne virus infections, which are progressively infiltrating and entrenching themselves in new sections of the United States.

## TIME PER SERVICE IN A CHILDREN'S DENTAL CLINIC<sup>1</sup>

By ISIDORE ALTMAN, *Statistician, United States Public Health Service*

The care of children's teeth must be a fundamental consideration in approaching the problem of dental health; yet sufficient data upon which to base any action appear to be lacking. To augment available information on the dental needs and treatment of children, the Division of Public Health Methods of the United States Public Health Service has undertaken a number of studies of children's dental care in cooperation with representative dental clinics and public dental health agencies.

These studies are directed toward the determination of two major factors: the volume of services required by children, and the amount of time necessary to provide those services. Such data on volume and time represent (a) the size of the problem of dental care in children and (b) the personnel, in terms of professional man-hours, required to meet the problem. With this information, it is possible to arrive at estimates of the necessary extent and cost of programs of care.

The present paper is based on the first of the proposed studies and deals with the amount of time required—in one clinic at least—for the routine and more commonly occurring children's dental services. No effort to explore the quality of work done has been undertaken in these time studies. Since clinics serving the public, however, generally maintain some safeguard over quality of work, through supervision, inspection by the dental society, or other means, it is assumed that an adequate standard of quality is being preserved.

### MATERIAL

The material for this report was gathered in the clinics of the Philadelphia Mouth Hygiene Association, a social agency which operates six dental clinics,<sup>2</sup> strategically located throughout the city of Philadelphia, for children in low economic circumstances. The children pay 50 cents per visit for routine treatment, and comparably low fees are charged for prosthetic appliances and orthodontia. The clinics themselves vary in size, from two chairs to six, in relation to the demands in each area. They are staffed by dentists employed on a full-time salaried basis and by hygienists and hygienist-interns who usually perform the prophylaxes and manage the administrative and clerical details of the clinics.

The record forms in use by the Association clinics will be reproduced in another paper where they will be more appropriate to the text.

<sup>1</sup> From the Division of Public Health Methods.

<sup>2</sup> The number has varied with circumstances. Present plans are to add two new clinics. The Association's largest clinic has been closed awaiting the completion of new quarters.

That paper will deal with volume of treatment of different kinds received by a representative group of children over several years, and with the number of visits required to provide such treatment.

#### METHOD OF RECORDING TIME AND NUMBER OF OBSERVATIONS

On and after August 1, 1945, the dentists and hygienists of the Philadelphia Mouth Hygiene Association were instructed to write on the case record the clock time they commenced and completed a treatment. For example, the entry for the time taken for an extraction might appear as "2:10-2:24," the entry being made in the column provided for that visit. Time was ordinarily recorded from the moment the dentist began to attend the child to the moment the child left the chair. Time was not counted for the period following an extraction when the patient would customarily rest in another chair before leaving the clinic. Allowance was also made for such interruptions as telephone calls.

The recordings of operating time were allowed to accumulate for a little over 3 months in the 5 clinics in operation at the time. Then, in November, a full day was spent in each of the 4 smaller clinics and 2 days in the largest clinic tabulating these time recordings. As many successive records as possible were gone through, with one letter of the alphabet being taken at a time. The minutes per operation were tabulated, as well as age, sex, and color of the child, identity of the operator and of the treated tooth. That a representative sample of all the time recordings was collected by this method is evidenced by the fact that in 3 clinics over half the letters of the alphabet were covered; in the largest clinic, 8 letters (a-b-c-r-s-t-u-v) were completed. In all, 2,706 routine operations for 1,068 children were tabulated, an average of 2.5 observations per child.

On the days that these entries were transcribed for the purpose of analysis, independent observations were made on the recordings of 9 of the 12 dentists then employed, to check uniformity in writing down the time of treatment. The observer's and the dentists' averages are shown in table 1. The differences found, except for 2 dentists, were small, and for the group the tendency toward understatement was balanced by the tendency in the other direction. Thus, it may be confidently concluded that the procedure followed produces consistent and, on the whole, accurate results, although the table suggests that some independent check should be made of the dentists' self-observations.

Adjustments were made for dentists "IV" and "VII" to bring them in line with the others by increasing the entries of the former by 4 minutes and decreasing those of the latter by 3 minutes. Dentists "II" and "III" persistently rounded their entries to the nearest 5 minutes; but, as the table shows, these entries concurred in the average

TABLE 1.—*Comparison of sample time recordings by 9 dentists with independent observations. Philadelphia Mouth Hygiene Association, 1945*

Dentist (1)	Number of observa- tions (2)	Average number of minutes recorded by—		Difference, column (3)—col- umn (4) (5)
		Dentist (3)	Observer (4)	
I.....	16	13.3	13.7	-0.4
II.....	8	11.9	11.5	+ .4
III.....	8	15.8	16.8	-1.0
IV.....	11	8.1	12.5	-4.4
V.....	25	14.7	14.4	+ .3
VI.....	26	12.4	12.5	-.1
VII.....	13	13.1	9.7	+3.4
VIII.....	4	12.2	11.0	+1.2
IX.....	3	12.3	11.3	+1.0
All dentists.....	114	12.9	12.9	0.0

with the observer's findings. Unfortunately, the time recordings by the hygienists could not be checked in this way.

*Age, color, and sex composition.*—The age, color, and sex distribution of the children for whom time of operation was recorded is shown in table 2. The great majority of the children ranged in age from 6 through 15 years, with the average at 10.8 years. This distribution agrees fairly well with that of all United States school children in these age limits, and adjustment for such age differences as there are would have little appreciable effect upon the average time for the entire group since variation with age was small (see table 4). The agreement in number and distribution between white boys and girls and between Negro boys and girls is quite remarkable since observations were tabulated as they came up in alphabetical sequence.

TABLE 2.—*Number of children, by sex, color, and age groups, for whom length of time of operation was recorded. Philadelphia Mouth Hygiene Association, 1945*

Color and sex	Average (years)	All Ages	Age in years												
			Under 6	6	7	8	9	10	11	12	13	14	15	16 and over	
All children.....	10.8	1,068	53	74	80	87	104	102	99	111	92	106	77	83	
White:															
Boys.....	10.3	419	17	28	37	43	56	40	40	48	37	33	23	17	
Girls.....	11.0	419	27	26	22	33	31	36	39	45	40	48	38	34	
Negro:															
Boys.....	10.8	110	3	15	12	6	7	10	9	7	8	11	8	14	
Girls.....	11.4	119	6	5	9	5	10	16	11	11	7	14	7	18	

<sup>1</sup> Includes 1 child of unknown sex and color.

#### TIME PER OPERATION

*All children.*—In table 3 and figure 1 is shown the average time required for a prophylaxis, a "tooth-filling," an extraction, and a polishing. Tabulations for fillings were made only where the treatment indicated for a tooth had been completed, whether one surface



or more than one surface was filled. Hence, the term "tooth-filling" will be employed to indicate throughout that fillings are being considered only on a per tooth basis. Polishings were separately timed since it is the policy in these clinics to devote a final session to the polishing of fillings. Hence, in comparing these findings with those of other time studies, it is important to know as to the latter whether or not the minutes for polishing are included with those for fillings.

The average time for a prophylaxis was 15.5 minutes. This is an

TABLE 3.—Average time per operation, by color and sex of children, Philadelphia Mouth Hygiene Association, 1945

Color and sex	Prophy- laxis	Tooth filling	Extraction		Polishing
			Deciduous teeth	Perma- nent teeth	
	Average time (minutes) $\pm 1$ standard deviation				
All children.....	15.5 $\pm$ 6.1	16.8 $\pm$ 8.4	9.3 $\pm$ 4.6	12.5 $\pm$ 4.4	11.8 $\pm$ 4.1
White:					
Boys.....	15.5 $\pm$ 6.2	17.4 $\pm$ 9.0	9.5 $\pm$ 4.1	12.3 $\pm$ 3.8	12.7 $\pm$ 4.1
Girls.....	15.0 $\pm$ 5.5	17.0 $\pm$ 9.1	10.0 $\pm$ 4.7	12.5 $\pm$ 4.8	10.8 $\pm$ 4.4
Negro:					
Boys.....	16.3 $\pm$ 6.6	14.8 $\pm$ 6.5	7.4 $\pm$ 3.0	11.4 $\pm$ 3.8	(1)
Girls.....	16.9 $\pm$ 7.0	15.4 $\pm$ 6.5	10.2 $\pm$ 4.7	14.0 $\pm$ 4.6	(1)
	Number of observations				
Total.....	559	1,582	300	163	*102
White:					
Boys.....	231	663	145	44	42
Girls.....	217	621	90	62	40
Negro:					
Boys.....	57	149	34	29	11
Girls.....	54	149	31	28	8

\* Averages omitted because of small number of observations.

\* Includes 1 child of unknown sex and color.

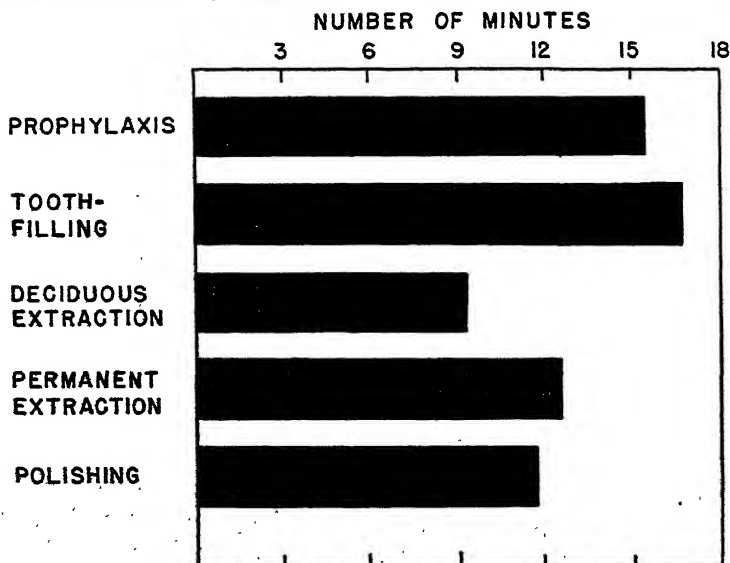


FIGURE 1.—Average number of minutes per specified treatment. Philadelphia Mouth Hygiene Association, 1945

average for dentists and hygienists combined (see table 5). The further treatments required by the child were generally noted at the prophylaxis sitting, but this procedure took little time which could not be separated from the prophylaxis proper.

The average time per tooth-filling was 16.8 minutes, and per extraction 10.4 minutes—12.5 minutes for a permanent tooth and 9.3 minutes for a deciduous tooth. The extractions were of a kind requiring only a local anesthetic; the more complicated extractions are referred to hospital dental surgery departments. For this reason, no data for time of postoperative treatment were available. Time was ordinarily recorded from the moment the child sat in the chair to a minute or two after the extraction. As was stated above, the dentists did not record the time the child had to wait before he was permitted to leave the clinic.

It frequently happens that more than one deciduous tooth is extracted at one sitting. Of the 300 deciduous extractions shown in table 3, 119 were part of such multiple extractions. The average time per tooth when there were multiple deciduous extractions was 5.9 minutes.

There were 102 observations of polishing time. For this number, the average length of time was 11.8 minutes. As closely as one could tell, the number of teeth polished was 4.9 per child—with a resultant average polishing time per tooth of 2.4 minutes.

*Color and sex.*—Table 3 also shows the time per operation by color and sex of the children. With one exception, the differences that were found were small. Only time per tooth-filling showed a statistically significant difference between white and Negro children; the average time per white child was 17.2 minutes, per Negro child, 15.1 minutes. This item will be checked where possible when other clinics are studied. The only other color and sex difference that may have some meaning is the finding that for both the deciduous and permanent teeth, extractions for Negro boys took the shortest amount of time.

*Age.*—Average time per operation for each age year is shown in table 4 and figure 2. On the whole, there seems to be little relation between minutes required for a treatment of these routine kinds and the child's age. The older children take somewhat longer for a prophylaxis. Time per tooth-filling shows an increase from 15 minutes in the very young to 18 minutes at 9 and 10 years and then a decrease to 16 minutes at 15 and 16 years. The length of time for extracting a permanent tooth shows a tendency to decrease with increasing age.

*Speed of operators.*—Affecting these time studies is, of course, the speed of the dentists and, for prophylaxes, of the hygienists as well. The 12 dentists who were observed<sup>3</sup> ranged in age from 23 years to

<sup>3</sup> Actually, there were 14 dentists in the period studied, but 2 dentists, who left the association's employ early in the study, accounted for only 21 of the 2,708 observations.

TABLE 4.—Average time per operation, by age of children. Philadelphia Mouth Hygiene Association, 1945

Operation	Age in years											
	Under 6	6	7	8	9	10	11	12	13	14	15	16 and over
	Average time (minutes) <sup>1</sup>											
Prophylaxis.....	13.9	12.8	14.4	14.8	15.3	15.7	16.4	15.7	15.9	17.4	16.1	18.5
Tooth-filling.....	15.0	15.6	15.8	17.8	18.4	18.1	17.4	17.0	16.8	16.7	16.5	15.4
Extraction:												
Deciduous.....	9.5	9.0	8.8	9.2	9.7	9.7	10.6	10.6	12.3	12.2	12.2	11.7
Permanent.....							15.9	13.6	12.3	12.2	12.2	11.7
	Number of observations											
Prophylaxis.....	36	45	42	56	55	64	48	59	45	45	34	30
Tooth-filling.....	69	104	119	125	131	136	147	193	164	172	121	101
Extraction:												
Deciduous.....	22	38	54	47	46	47	28	7	6	4	-----	1
Permanent.....			3	2	8	9	11	14	19	36	21	40

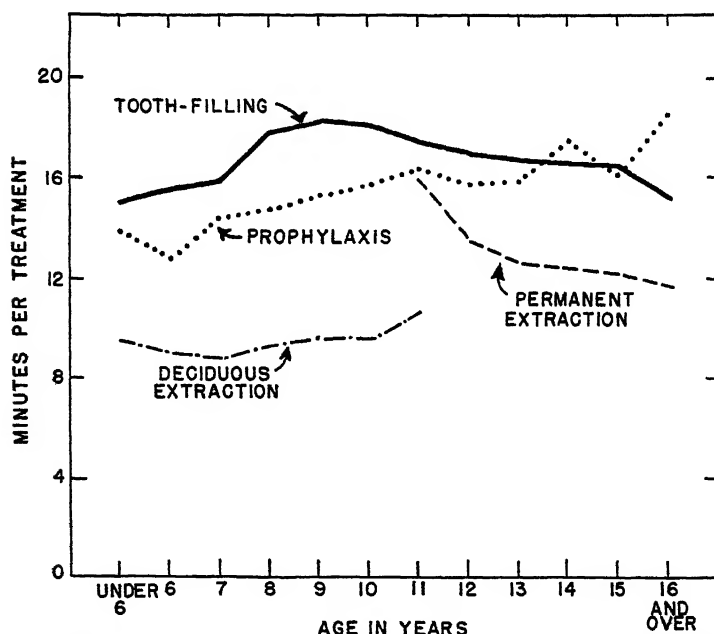
<sup>1</sup> Averages based on 10 or less observations are omitted.

FIGURE 2.—Average number of minutes per specified treatment and age in years. Philadelphia Mouth Hygiene Association, 1945.

60 years, with 7 dentists under 30. The concentration of younger men is understandable, since these clinics attract new graduates who look upon service with the Philadelphia Mouth Hygiene Association as akin to an internship in children's dentistry. The oldest dentist is clinic supervisor for the association.

Table 5 shows the average time for filling a tooth and for an extraction for the 12 dentists observed. In addition, average time for a prophylaxis is shown for 6 dentists and 6 hygienists for whom there was a sufficient number of cases recorded. The dentists are lettered from A through L in order of increasing age.

It is readily apparent that, for this group of dentists at least, there is little discernible relationship between age and speed. All that can

TABLE 5.—Average time per operation by dentist or hygienist. Philadelphia Mouth Hygiene Association, 1945

Operation	Dentists												Hygienists					
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Average time (minutes)																		
Prophylaxis.....	12.7	---	11.1	12.6	17.4	( <sup>1</sup> )	---	---	---	---	---	11.6	22.7	19.7	14.6	15.5	16.6	16.0
Tooth-filling.....	15.6	21.6	17.1	12.8	17.2	18.8	12.1	15.5	10.6	12.5	17.4	9.9	---	---	---	---	---	---
Extraction.....	10.1	13.7	9.7	11.0	12.1	( <sup>1</sup> )	9.5	7.6	7.6	12.4	10.5	9.8	---	---	---	---	---	---
Number of observations																		
Prophylaxis <sup>2</sup> .....	29	---	83	22	21	7	---	---	---	---	---	38	15	102	71	72	30	39
Tooth-fillings <sup>3</sup> .....	89	307	199	64	104	30	89	85	59	167	149	100	---	---	---	---	---	---
Extraction <sup>4</sup> .....	34	65	58	12	24	7	48	54	25	44	56	30	---	---	---	---	---	---

<sup>1</sup> Average omitted because of smaller number of observations.

<sup>2</sup> Total observations, 529. Difference from total in table 3 (559) accounted for by dentists and hygienists not included in this table because of small number of observations.

<sup>3</sup> Total observations, 1,442. Difference from total in table 3 (1,582) accounted for by 9 fillings done by 2 dentists not included in table and 131 fillings involving more than 1 dentist.

<sup>4</sup> Total observations, 457. Difference from total in table 3 (463) accounted for by 6 extractions by dentist not included in table.

be said is that, with the exception of dentist "K," the older men do appear to be somewhat more rapid operators.

Of the hygienists, "N" and "Q" are employees of several years' standing while the other four are hygienist-interns. Here too, there is apparently no difference in rapidity of performance between the more and less experienced. However, when dentists and hygienists are compared for prophylaxis time, it is seen that the dentists take a significantly smaller amount of time on the average.

*Type of tooth.*—The different kinds of teeth have been divided in table 6, into deciduous and permanent, with further rough sub-

TABLE 6.—Average time to fill tooth, by type of tooth. Philadelphia Mouth Hygiene Association, 1945

	Tooth group <sup>1</sup>					
	I	II	III	IV	V	VI
Average time to fill tooth (minutes).....	14.4	13.1	15.2	14.9	18.4	13.1
Number of teeth.....	267	26	67	287	918	17

<sup>1</sup> Deciduous:

I Upper and lower molars.

II All other deciduous teeth.

Permanent:

III Upper central and lateral incisors.

IV Upper and lower premolars.

V Upper and lower molars.

VI All other permanent teeth.

division according to morphological type and relationship to caries attack. The great majority of teeth filled are molars and premolars and it was to be expected that the bulk of the time recordings in a group of children such as this would involve fillings in the first permanent molars. These molars require more time for filling than any of the others, 18.4 minutes on the average as compared with 15.2 minutes for the permanent upper incisors and 14.9 minutes for the permanent bicuspids. By the same token the dentists spend more time per tooth on the deciduous molars, 14.4 minutes, than on the other deciduous teeth, 13.1 minutes.

#### COMPARISON WITH OTHER STUDIES

Few other studies of this kind have been reported; and these have been reported in such a way as to make comparison difficult. In table 7 there is shown a summary comparison with the estimates of

TABLE 7.—*Comparison of time data from three studies*

Item	Philadelphia Mouth Hygiene Association	Lee-Jones <sup>1</sup>	Brandhorst <sup>2</sup>
Number of dentists reporting.....	12	-----	8
Number of children.....	1,088	-----	6,644
Age group (years).....	4-17	5-17	5
Minutes for:			
Prophylaxis.....	15.5	30	20
Tooth-filling.....	16.8	45	37
Extraction: Deciduous.....	9.3	15	-----
Permanent.....	12.5	* 20	* 27

<sup>1</sup> See reference (1).

<sup>2</sup> See reference (2).

\* From data for young adults.

time made for Lee and Jones (1) by practicing dentists and with a study of St. Louis children reported by Brandhorst in which the "data were compiled from reports submitted by good operators" (2).

The time recorded in the two latter reports is far in excess of that observed in the present study, but we do not know just how the observations were made and what factors were taken into consideration; for example, the time for polishing is very likely included with time for filling in these reports. Conditions may be sufficiently different between private practice and that in clinics, where assistants maintain a routine, constant flow of patients, to account in large part for these variations in time. It is not unlikely that valid contrast can only be had between studies made under parallel conditions.

#### SUMMARY

1. Data have been presented on the time it takes to perform routine dental operations for children. The study was made in the clinics of the Philadelphia Mouth Hygiene Association, where over 2,700 observations were tabulated.

2. The average number of minutes per operation was found to be as follows:

Prophylaxis.....	15.5
Tooth-filling.....	16.8
Extraction of a deciduous tooth.....	9.3
Extraction of a permanent tooth.....	12.5
Polishing.....	11.8

3. Differences by color and sex and by age are shown in the tables. In general, these differences are small.

4. Operating time for prophylaxes, fillings, and extractions among 12 dentists showed considerable variation, but little association with age and experience of the practitioner.

5. Upper and lower permanent molars required 18.4 minutes to fill on the average, significantly more than other teeth in the mouth.

6. Average time reported in two other studies is greater than that found here, but validity of the comparison is questionable.

#### ACKNOWLEDGMENT

Appreciative thanks are due first to Lt. Col. William C. Webb, Jr., executive director of the children's dental clinics of the Philadelphia Mouth Hygiene Association, and the members of his staff. Without their cooperation and many hours of assistance, the study would not have been possible. Acknowledgment must also be made of the advice and assistance received from Dr. Antonio Ciocco and Dr. Henry Klein of the Division of Public Health Methods. Responsibility for tabulation and for the preparation of tables and charts was borne by Mrs. Marion Lee Fatt of this Division.

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- (1) Lee, Roger I., and Jones, Lewis W.: *The Fundamentals of Good Medical Care*. Chicago, University of Chicago Press, 1933 (Committee on the Costs of Medical Care, Publication No. 22).
- (2) Brandhorst, O. W.: Some facts that should be considered in any plan for dental service for the masses. *J. Am. Coll. Dentists*, 5: 273-288 (December 1938).

**DEATHS DURING WEEK ENDED JULY 20, 1946**

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 20, 1946	Correspond- ing week, 1945
Data for 93 large cities of the United States:		
Total deaths.....	8,093	7,698
Average rate per 1,000 population.....	11.1	10.7
Total deaths, first 29 weeks of year.....	273,272	267,820
Deaths under 1 year of age.....	650	531
Average for 3 prior years.....	594	
Deaths under 1 year of age, first 29 weeks of year.....	18,095	17,619
Data from industrial insurance companies:		
Policies in force.....	67,231,494	67,386,918
Number of death claims.....	11,331	13,294
Death claims per 1,000 policies in force, annual rate.....	8.8	10.3
Death claims per 1,000 policies, first 29 weeks of year, annual rate.....	10.1	10.7

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED JULY 27, 1946

#### Summary

A total of 912 cases of poliomyelitis was reported for the week, as compared with 668 last week, 391 for the corresponding week last year, and 740 for the same week in 1944. The last-named figure is the largest number reported for any previous corresponding week for which weekly records are available (since 1927). Slight decreases were recorded in the New England and East South Central areas. Increases were slight in the Middle Atlantic, South Atlantic, and West South Central areas. The largest increases, as well as about 52 percent of the week's total, occurred in the East North Central area (71 to 146) and the West North Central (213 to 328). Increases of 6 or more cases were reported in 16 States, as follows: New York (22 to 30), Ohio (13 to 38), Indiana (5 to 11), Illinois (42 to 66), Michigan (7 to 13), Wisconsin (4 to 18), Minnesota (97 to 188), North Dakota (3 to 11), Nebraska (20 to 32), Georgia (3 to 16), Tennessee (0 to 6), Mississippi (19 to 25), Oklahoma (6 to 33), Washington (2 to 11), Oregon (1 to 9), and California (38 to 52). Decreases of 4 or more cases occurred in New Hampshire (12 to 8), New Jersey (9 to 5), South Dakota (11 to 5), Florida (24 to 20), Alabama (33 to 18), Louisiana (27 to 18), Texas (61 to 52), Wyoming (8 to 4), and New Mexico (12 to 6).

The total to date is 4,172, as compared with a 5-year median for the period of 2,316 and 3,180 for the corresponding period in 1934, the latter being the largest number recorded for the corresponding period of any previous year of record. However, the annual total for 1934 was only 7,517. Weekly records are not available for the year 1916. In that year 28 States reported a total of 6,727 cases for the first 7 months of the year (4,445 in New York) and 27,363 for the entire year (New York 13,223).

Of the total of 144 cases of typhoid and paratyphoid fever (as compared with 109 last week and a 5-year median of 237), Indiana reported 12 (last week 4, preceding week 14) and Michigan reported 15.

Deaths recorded during the week in 93 large cities of the United States totaled 8,256, as compared with 8,087 last week, 8,346 and 7,971, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year average of 8,243. The cumulative number is 281,522, as compared with 276,166 for the same period last year.



*Telegraphic morbidity reports from State health officers for the week ended July 27, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	July 27, 1946	July 28, 1945		July 27, 1946	July 28, 1945 <sup>1</sup>		July 27, 1946	July 28, 1945		July 27, 1946	July 28, 1945	
NEW ENGLAND												
Maine	0	0	0	—	—	—	35	3	11	0	0	1
New Hampshire	0	0	0	—	—	—	53	1	4	1	1	0
Vermont	0	0	0	—	—	—	58	6	20	0	0	0
Massachusetts	3	4	2	—	—	—	319	115	164	0	5	5
Rhode Island	0	0	1	—	—	—	14	1	11	1	2	1
Connecticut	2	0	0	1	1	—	51	12	44	2	1	1
MIDDLE ATLANTIC												
New York	7	5	7	11	12	12	493	42	211	9	8	10
New Jersey	1	1	1	2	2	2	165	20	58	0	2	4
Pennsylvania	8	7	7	2	—	—	202	169	85	3	10	10
EAST NORTH CENTRAL												
Ohio	8	5	3	1	1	1	238	13	43	5	6	4
Indiana	3	1	2	—	1	1	16	4	8	0	1	1
Illinois	3	5	8	3	2	3	69	129	77	5	8	8
Michigan <sup>2</sup>	4	12	4	1	—	—	84	95	95	1	4	4
Wisconsin	8	2	3	4	—	7	262	42	196	1	3	1
WEST NORTH CENTRAL												
Minnesota	5	14	2	—	—	1	23	6	13	2	2	1
Iowa	3	1	1	—	—	—	39	11	18	2	1	1
Missouri	3	0	2	—	—	—	5	18	18	3	5	5
North Dakota	0	0	0	—	—	—	8	—	4	0	1	0
South Dakota	0	0	1	—	—	—	2	1	2	1	0	0
Nebraska	1	3	3	—	1	1	2	11	11	0	1	0
Kansas	3	6	2	1	—	—	10	11	14	0	0	1
SOUTH ATLANTIC												
Delaware	1	0	0	—	—	—	3	—	—	0	0	0
Maryland <sup>2</sup>	4	10	1	—	—	1	81	9	27	0	0	3
District of Columbia	0	0	0	—	—	—	20	—	6	0	1	1
Virginia	9	5	3	71	39	45	49	7	13	3	2	2
West Virginia	2	4	3	1	15	2	24	3	4	3	2	2
North Carolina	3	7	7	—	—	—	27	3	18	0	3	3
South Carolina	3	24	4	98	73	73	46	9	15	0	0	2
Georgia	2	3	4	—	1	8	10	—	7	0	2	1
Florida	6	1	3	—	—	3	4	12	12	2	4	4
EAST SOUTH CENTRAL												
Kentucky	3	4	3	—	—	—	55	15	10	0	0	1
Tennessee	4	2	2	4	6	6	15	2	5	2	2	1
Alabama	6	16	5	12	—	4	28	4	13	2	9	3
Mississippi <sup>2</sup>	0	8	3	—	—	—	—	—	—	2	0	0
WEST SOUTH CENTRAL												
Arkansas	3	4	0	20	2	5	16	4	4	1	1	1
Louisiana	1	3	3	13	1	3	35	2	2	0	4	1
Oklahoma	1	2	2	—	14	6	18	10	5	4	1	0
Texas	15	45	27	222	372	197	107	82	82	5	7	3
MOUNTAIN												
Montana	1	1	1	—	3	—	36	1	3	0	0	0
Idaho	0	1	0	5	6	—	2	36	5	0	0	0
Wyoming	0	0	1	—	—	5	6	1	8	0	0	0
Colorado	1	4	4	—	15	15	34	11	16	0	1	0
New Mexico	13	4	1	1	3	2	12	18	9	0	0	0
Arizona	3	1	1	32	29	23	14	5	24	1	0	0
Utah <sup>2</sup>	0	0	0	—	—	—	15	95	25	0	0	0
Nevada	0	0	0	—	—	—	—	—	2	0	0	0
PACIFIC												
Washington	2	11	3	—	1	—	19	76	41	0	4	3
Oregon	1	1	1	—	—	3	17	25	25	1	1	1
California	18	20	10	8	1	24	213	354	333	13	6	6
Total	164	247	150	503	591	591	3,054	1,494	1,863	75	111	111
30 weeks	9,232	7,565	6,015	190,197	68,898	80,073	633,750	93,605	531,495	4,274	5,881	5,881

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended July 27, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	July 27, 1946	July 28, 1945		July 27, 1946	July 28, 1945		July 27, 1946	July 28, 1945		July 27, 1946	July 28, 1945	
NEW ENGLAND												
Maine.....	0	6	0	12	9	9	0	0	0	1	1	1
New Hampshire.....	8	2	0	0	4	0	0	0	0	0	0	0
Vermont.....	0	2	0	3	2	1	0	0	0	0	0	1
Massachusetts.....	4	13	2	41	32	48	0	0	0	5	1	1
Rhode Island.....	0	0	0	1	0	1	0	0	0	0	0	0
Connecticut.....	6	11	3	4	5	8	0	0	0	2	1	0
MIDDLE ATLANTIC												
New York.....	30	72	11	57	212	73	0	0	0	2	5	10
New Jersey.....	5	32	3	14	15	15	0	0	0	2	2	3
Pennsylvania.....	11	16	8	31	69	52	0	0	0	6	14	7
EAST NORTH CENTRAL												
Ohio.....	38	14	11	73	51	51	0	0	0	6	8	8
Indiana.....	11	2	2	5	12	12	1	0	0	12	2	2
Illinois.....	66	3	6	18	37	37	0	0	0	2	0	7
Michigan <sup>2</sup> .....	13	8	8	29	115	35	0	3	0	15	6	5
Wisconsin.....	18	0	0	22	32	32	0	0	0	0	1	0
WEST NORTH CENTRAL												
Minnesota.....	188	0	2	8	22	20	0	0	0	0	0	0
Iowa.....	17	2	2	8	9	11	1	0	0	0	0	1
Missouri.....	38	2	2	8	11	11	0	0	0	5	5	4
North Dakota.....	11	0	0	1	1	3	0	0	0	1	1	0
South Dakota.....	5	0	0	3	1	2	0	0	0	0	0	0
Nebraska.....	32	0	1	5	8	6	0	0	0	0	0	0
Kansas.....	36	4	4	9	24	20	0	0	0	2	1	1
SOUTH ATLANTIC												
Delaware.....	1	0	0	1	0	1	0	0	0	1	0	0
Maryland <sup>2</sup> .....	6	8	3	9	22	9	0	0	0	5	3	3
District of Columbia.....	0	5	1	4	5	5	0	0	0	0	1	0
Virginia.....	6	22	3	12	19	16	0	0	0	4	4	8
West Virginia.....	2	1	1	12	24	13	0	0	0	3	3	3
North Carolina.....	2	2	3	12	13	13	0	0	0	3	2	7
South Carolina.....	1	7	2	1	4	3	0	0	0	3	6	6
Georgia.....	16	4	4	4	7	10	0	0	0	4	10	13
Florida.....	20	6	3	3	3	3	0	0	0	2	18	4
EAST SOUTH CENTRAL												
Kentucky.....	4	3	11	4	19	16	0	0	0	7	6	8
Tennessee.....	6	29	15	9	10	10	0	0	0	5	6	7
Alabama.....	17	9	9	7	8	8	0	0	0	3	2	6
Mississippi <sup>2</sup> .....	25	1	1	3	6	3	0	1	0	4	9	8
WEST SOUTH CENTRAL												
Arkansas.....	*18	0	2	5	2	2	0	0	0	4	6	8
Louisiana.....	18	6	3	1	1	2	0	0	0	3	2	6
Oklahoma.....	33	12	4	8	14	6	1	0	0	1	3	4
Texas.....	52	40	8	17	26	20	0	0	0	7	15	27
MOUNTAIN												
Montana.....	3	1	1	5	5	5	0	0	0	0	2	2
Idaho.....	1	0	0	11	4	4	1	0	0	2	1	0
Wyoming.....	4	2	0	0	0	2	0	0	0	0	0	0
Colorado.....	43	1	0	32	16	12	0	0	0	1	6	5
New Mexico.....	6	0	1	4	3	2	0	0	0	2	1	3
Arizona.....	9	1	0	3	2	2	0	0	0	4	0	1
Utah <sup>2</sup> .....	5	11	2	7	3	3	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	11	9	1	4	17	8	0	0	0	4	4	1
Oregon.....	9	1	1	5	6	6	0	0	0	5	0	1
California.....	52	21	13	54	103	71	0	0	0	3	6	6
Total.....	912	391	361	589	1,013	706	4	4	4	146	165	237
30 weeks.....	*4,172	2,439	2,316	35,067	132,165	95,462	270	239	598	2,076	2,298	2,747

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 4; Connecticut 1; New Jersey 2; Ohio 1; Indiana 2; West Virginia 1; Georgia 1; Louisiana 2; Oregon 1.

<sup>3</sup> Correction: Arkansas, poliomyelitis, weeks ended June 1 and June 8, 1946, 0 and 1 case, respectively, (instead of 1 and 2).

Telegraphic morbidity reports from State health officers for the week ended July 27, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Week ended—		Med- ian 1941- 45	Dysentery			En- ceph- alitis, infectious	Rocky Mt. spotted fever	Tula- remia	Ty- phus fever en- demic	Un- dulant fever
	July 27, 1946	July 28, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	33	51	30	—	—	—	—	—	—	—	1
New Hampshire.....	4	2	2	—	—	—	—	—	—	—	2
Vermont.....	20	21	23	—	—	—	—	—	—	—	3
Massachusetts.....	119	140	131	—	1	—	—	—	—	—	—
Rhode Island.....	14	—	6	—	—	—	—	—	—	—	—
Connecticut.....	34	71	57	—	—	—	—	—	—	—	5
MIDDLE ATLANTIC											
New York.....	117	378	279	7	4	—	—	4	—	1	2
New Jersey.....	136	195	169	—	—	—	—	—	—	—	3
Pennsylvania.....	109	244	254	—	—	—	1	1	—	—	7
EAST NORTH CENTRAL											
Ohio.....	104	192	227	—	—	—	1	1	1	—	—
Indiana.....	28	25	27	1	—	—	—	—	1	—	7
Illinois.....	198	165	165	4	1	—	1	5	1	—	12
Michigan <sup>1</sup> .....	193	143	234	—	—	—	—	—	—	—	2
Wisconsin.....	204	57	186	—	—	—	—	—	—	—	8
WEST NORTH CENTRAL											
Minnesota.....	12	10	40	5	—	—	1	—	—	—	—
Iowa.....	43	17	25	—	—	—	—	—	—	—	—
Missouri.....	28	45	22	—	—	—	—	2	3	—	2
North Dakota.....	1	3	10	—	—	—	—	—	—	—	—
South Dakota.....	—	—	5	—	—	—	—	—	—	—	2
Nebraska.....	5	4	19	—	—	—	—	—	—	—	—
Kansas.....	30	41	66	—	—	—	—	—	—	—	4
SOUTH ATLANTIC											
Delaware.....	5	8	1	—	—	—	—	1	—	—	1
Maryland <sup>1</sup> .....	16	78	76	—	—	—	—	4	—	—	2
District of Columbia.....	9	10	12	—	—	—	—	—	—	—	—
Virginia.....	132	99	92	—	—	136	—	7	2	—	2
West Virginia.....	20	46	28	—	—	—	—	1	—	—	—
North Carolina.....	120	189	184	—	24	—	—	6	—	5	—
South Carolina.....	60	67	67	—	—	—	—	—	—	1	—
Georgia.....	—	17	17	1	—	—	—	—	2	26	2
Florida.....	18	15	19	6	1	2	1	—	—	18	2
EAST SOUTH CENTRAL											
Kentucky.....	140	52	72	—	—	—	1	1	1	—	—
Tennessee.....	25	33	34	—	1	2	1	5	3	2	1
Alabama.....	20	33	26	4	—	—	1	2	—	14	2
Mississippi <sup>1</sup> .....	—	—	—	—	—	—	—	—	—	5	4
WEST SOUTH CENTRAL											
Arkansas.....	10	12	14	1	1	—	—	—	8	2	1
Louisiana.....	18	1	4	—	1	—	—	—	1	7	—
Oklahoma.....	14	14	14	—	—	—	1	1	—	—	—
Texas.....	173	213	213	24	310	41	—	—	2	28	12
MOUNTAIN											
Montana.....	6	7	24	—	—	—	—	—	—	—	—
Idaho.....	36	9	6	—	—	2	—	—	—	—	—
Wyoming.....	2	1	5	—	—	—	—	1	—	—	—
Colorado.....	11	62	29	—	—	—	—	—	—	—	2
New Mexico.....	10	4	7	—	2	1	—	—	—	—	—
Arizona.....	—	19	19	—	—	33	1	—	—	—	2
Utah <sup>1</sup> .....	11	23	72	—	—	—	—	—	—	—	—
Nevada.....	—	—	1	—	—	—	—	—	—	—	—
PACIFIC											
Washington.....	35	34	34	—	—	—	—	—	—	—	1
Oregon.....	35	25	25	—	—	2	—	—	—	—	1
California.....	70	212	212	6	5	—	5	—	—	8	5
Total.....	2,428	3,115	3,693	59	351	219	15	42	25	107	100
Same week, 1945.....	3,115	—	—	32	701	343	23	28	23	151	115
Average, 1943-45.....	3,074	—	—	50	668	361	16	422	16	4130	—
30 weeks: 1946.....	57,712	—	—	1,693	10,369	3,941	319	302	571	1,776	2,877
1945.....	76,405	—	—	1,077	14,305	4,219	228	259	479	2,137	2,844
Average, 1943-45.....	84,947	—	112,867	1,085	11,691	4,003	304	4284	461	1,768	—

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

## WEEKLY REPORTS FROM CITIES

City reports for week ended July 20, 1946

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infections, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	16	0	0	0	1	0	1	-----
New Hampshire:												
Concord.....	0	0	-----	0	1	0	0	0	1	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Massachusetts:												
Boston.....	1	0	-----	1	47	0	5	0	2	0	0	17
Fall River.....	0	0	-----	0	7	0	0	0	0	0	0	-----
Springfield.....	0	0	-----	0	10	0	0	0	2	0	0	2
Worcester.....	0	0	-----	0	43	0	6	0	2	0	0	44
Rhode Island:												
Providence.....	0	0	-----	0	20	0	1	0	4	0	0	8
Connecticut:												
Bridgeport.....	0	0	-----	0	2	0	2	0	0	0	0	5
Hartford.....	0	0	-----	0	2	0	0	2	0	0	0	9
New Haven.....	0	0	-----	0	3	0	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo.....	1	0	-----	0	2	2	1	1	2	0	0	3
New York.....	4	1	4	1	110	5	28	14	19	0	2	47
Rochester.....	0	0	-----	0	4	0	0	1	4	0	0	1
Syracuse.....	0	0	-----	0	1	0	0	1	6	0	0	2
New Jersey:												
Camden.....	0	0	-----	0	-----	0	0	0	0	0	0	2
Newark.....	0	0	1	-----	8	1	4	0	2	0	1	19
Trenton.....	0	0	-----	0	5	0	1	0	0	0	0	-----
Pennsylvania:												
Philadelphia.....	1	0	2	0	11	1	21	0	11	0	1	21
Pittsburgh.....	0	0	-----	0	9	0	9	3	7	0	0	5
Reading.....	0	0	-----	0	1	0	1	0	0	0	0	7
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0	-----	0	3	1	3	1	6	0	0	11
Cleveland.....	1	0	-----	0	114	1	2	12	14	0	2	7
Columbus.....	0	0	-----	0	5	0	0	0	0	0	0	2
Indiana:												
Fort Wayne.....	0	0	-----	0	2	0	4	0	0	0	0	-----
Indianapolis.....	0	0	-----	0	1	0	4	3	2	0	0	5
South Bend.....	0	0	-----	0	1	0	0	0	0	0	0	-----
Terre Haute.....	0	0	-----	0	2	0	1	0	0	0	0	1
Illinois:												
Chicago.....	0	0	1	0	16	1	15	12	12	0	0	79
Springfield.....	0	0	-----	0	-----	1	1	0	1	0	0	6
Michigan:												
Detroit.....	2	2	-----	0	5	0	4	4	8	0	3	64
Flint.....	0	0	-----	0	-----	0	2	0	1	0	0	6
Grand Rapids.....	0	0	-----	0	3	0	0	0	2	0	0	5
Wisconsin:												
Kenosha.....	0	0	-----	0	8	0	0	1	1	0	0	-----
Milwaukee.....	0	0	-----	0	13	0	1	0	0	0	0	82
Racine.....	0	0	-----	0	54	0	0	0	2	0	0	4
Superior.....	0	0	-----	0	4	0	0	0	0	0	0	4
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	2	0	-----	0	-----	0	1	1	0	0	0	1
Minneapolis.....	1	0	-----	0	5	0	5	50	4	0	0	-----
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	5	7	1	0	0	3
St. Joseph.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
St. Louis.....	0	2	-----	0	6	0	6	16	1	0	0	2

See footnotes at end of table.

## City reports for week ended July 20, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	1	0	0	0	1	0	3	2	2	0	0	1
Kansas:												
Topeka.....	0	0	0	0	0	0	0	3	0	0	0	11
Wichita.....	0	0	0	0	1	0	0	3	1	0	0	---
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	0	0	2	0	0	0	0	0	0	5
Maryland:												
Baltimore.....	3	0	1	1	112	0	7	1	3	0	0	12
Cumberland.....	0	0	0	0	0	0	0	0	0	0	0	0
Frederick.....	0	0	0	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington.....	0	0	0	0	24	0	6	0	1	0	1	4
Virginia:												
Lynchburg.....	0	0	0	0	4	0	0	0	2	0	0	---
Richmond.....	0	0	0	0	4	0	2	1	1	0	1	14
Roanoke.....	0	0	0	0	0	0	0	0	0	0	0	1
West Virginia:												
Charleston.....	0	0	0	0	0	0	0	0	0	0	0	---
Wheeling.....	0	0	0	0	0	0	0	0	0	0	0	16
North Carolina:												
Raleigh.....	0	0	0	0	1	0	1	0	1	0	0	9
Wilmington.....	0	0	0	0	0	0	2	0	0	0	0	---
Winston-Salem.....	0	0	0	0	8	0	0	0	0	0	0	---
South Carolina:												
Charleston.....	0	0	0	0	1	0	1	0	0	0	0	---
Georgia:												
Atlanta.....	0	0	0	0	3	0	3	1	0	0	0	---
Brunswick.....	0	0	0	0	0	0	0	0	0	0	0	---
Savannah.....	0	0	0	0	7	0	0	1	0	0	0	---
Florida:												
Tampa.....	11	0	0	0	1	0	2	3	0	0	0	3
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	0	0	5	1	3	2	1	0	2	12
Nashville.....	0	0	0	0	---	1	0	0	0	0	1	---
Alabama:												
Birmingham.....	0	0	1	0	2	0	1	6	1	0	1	1
Mobile.....	0	0	0	0	---	0	0	2	0	0	0	---
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	0	0	1	0	0	2	0	0	0	---
Louisiana:												
New Orleans.....	*10	0	3	0	*39	*7	*4	*11	0	0	3	5
Shreveport.....	0	0	0	0	---	1	1	1	0	0	0	---
Texas:												
Dallas.....	5	0	0	0	1	0	1	14	6	0	0	---
Galveston.....	0	0	0	0	---	0	0	0	0	0	0	---
Houston.....	1	0	0	0	4	0	2	5	0	0	0	---
San Antonio.....	0	0	0	1	---	0	2	4	1	0	0	2
MOUNTAIN												
Montana:												
Billings.....	0	0	0	0	5	0	0	1	1	0	0	---
Great Falls.....	0	0	0	0	4	0	1	0	0	0	0	---
Helena.....	0	0	0	0	1	0	0	0	0	0	0	---
Missoula.....	0	0	0	0	---	0	0	0	0	0	0	---
Idaho:												
Boise.....	0	0	0	0	---	0	0	0	1	0	0	---
Colorado:												
Denver.....	4	0	0	0	5	0	3	15	2	0	0	8
Pueblo.....	1	0	0	0	7	1	0	3	1	0	0	---
Utah:												
Salt Lake City.....	0	0	0	0	11	0	0	0	2	0	0	---

\*Monthly reports from Charity Hospital included; figures not used in computing rates.

## City reports for week ended July 20, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polio-myelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	9	0	2	0	3	0	0	3
Spokane.....	0	0	-----	0	1	0	0	1	1	0	0	3
Tacoma.....	0	0	-----	0	1	0	0	0	2	0	0	3
California:												
Los Angeles.....	3	0	2	0	22	1	3	9	11	0	2	4
Sacramento.....	3	0	-----	0	1	0	3	3	0	0	0	1
San Francisco.....	1	0	-----	0	14	1	3	3	7	0	0	2
Total.....	46	5	15	3	806	19	183	215	169	0	23	601
Corresponding week, 1944.....	32	-----	9	4	570	-----	205	-----	274	0	21	895
Average, 1941-45.....	42	-----	22	16	814	-----	228	-----	258	0	24	1,059

\* 3-year average, 1943-45.

† 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: New York 3; Indianapolis 1; Chicago 2; San Antonio 1.*Dysentery, bacillary.*—Cases: New Haven 1; Richmond 1; Nashville 1; Los Angeles 1.*Dysentery, unspecified.*—Cases: New Haven 1; Baltimore 1; San Antonio 6.*Leprosy.*—Cases: Chicago 1.*Rocky Mountain spotted fever.*—Cases: Philadelphia 1; Lynchburg 1; Richmond 4; Winston-Salem 1; Memphis 1; Nashville 1; Birmingham 2.*Typhoid fever.*—Cases: Duluth 2; Richmond 1; New Orleans 1.*Typhus fever, endemic.*—Cases: New York 1; Winston-Salem 1; Atlanta 1; Brunswick 1; Tampa 1; Memphis 1; Mobile 5; Little Rock 1; New Orleans\* 10; Houston 1; San Antonio 3; Los Angeles 1.

\*Including monthly reports from Charity Hospital.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1943, 34,086,800)

	Diphtheria case rates	Etiophthalmis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	2.6	0.0	0.0	2.6	395	0.0	36.6	5.2	31	0.0	2.6	225
Middle Atlantic.....	2.8	0.5	3.2	0.5	70	4.3	29.2	9.3	24	0.0	2.8	50
East North Central.....	1.8	1.2	0.6	0.0	140	2.4	22.5	20.1	30	0.0	3.0	163
West North Central.....	9.0	4.5	0.0	0.0	29	0.0	45.1	184.8	20	0.0	0.0	41
South Atlantic.....	22.9	0.0	1.6	1.6	273	0.0	39.2	11.4	13	0.0	3.3	105
East South Central.....	0.0	0.0	5.9	0.0	41	11.8	23.6	59.0	12	0.0	23.6	77
West South Central.....	24.3	0.0	8.6	0.0	24	4.0	24.3	105.2	20	0.0	8.6	20
Mountain.....	39.7	0.0	0.0	0.0	262	7.9	31.8	150.9	55	0.0	0.0	79
Pacific.....	11.1	0.0	3.2	0.0	74	3.2	17.4	25.3	38	0.0	3.2	32
Total.....	7.2	0.8	2.3	0.5	126	3.0	28.5	33.5	26	0.0	3.5	92

## PLAGUE INFECTION IN SAN LUIS OBISPO AND VENTURA COUNTIES, CALIF., AND KLAMATH COUNTY, OREG.

## CALIFORNIA

Plague infection has been reported proved, under dates of July 15 and 22, 1946, in pools of fleas and tissue from ground squirrels in California; as follows: *San Luis Obispo County*—207 fleas from 18 ground squirrels, *C. beecheyi*, taken 6 miles east of Santa Margarita;

200 fleas from 27 ground squirrels, same species, taken 2 miles east and 1 mile north of Santa Margarita; 200 fleas from burrows located 2 miles southwest of Santa Margarita. *Ventura County*—42 fleas, and in tissue from 2 ground squirrels found dead  $1\frac{1}{2}$  miles south of Moorpark, received at the laboratory on June 21.

#### OREGON

Under date of July 23, plague infection was reported proved in a pool of 9 fleas from 11 ground squirrels, *C. oregonus*, taken June 26 on road to Keno, from 2 to 7 miles northeast of Worden, Klamath County, Oreg.

#### TERRITORIES AND POSSESSIONS

##### Puerto Rico

*Notifiable diseases—4 weeks ended July 13, 1946.*—During the 4 weeks ended July 13, 1946, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox.....	26	Poliomyelitis.....	10
Diphtheria.....	39	Syphilis.....	115
Dysentery, unspecified.....	7	Tetanus.....	10
Gonorrhea.....	130	Tuberculosis (all forms).....	703
Influenza.....	39	Typhoid fever.....	10
Malaria.....	356	Typhus fever (murine).....	11
Measles.....	21	Whooping cough.....	140

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended June 29, 1946.*—During the week ended June 29, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		34	1	100	323	45	44	35	127	709
Diphtheria.....			1	22	7	1	1	1	4	37
Dysentery, bacillary.....				5						5
German measles.....		1		22	28		1	9	8	69
Influenza.....					4	2				6
Measles.....		13		256	335	136	10	223	48	1,021
Meningitis, meningococcus.....		1		1	5				2	9
Mumps.....				17	278	34	46	48	97	520
Poliomyelitis.....				4				3		7
Scarlet fever.....		1	2	28	36	21	3	7	14	112
Tuberculosis (all forms).....		5	7	194	48	14	5	19	63	355
Typhoid and paratyphoid fever.....				5	1	1	1		10	18
Undulant fever.....				1	7			1		9
Veneral diseases:										
Gonorrhea.....	1	23	3	60	158	45	53	45	136	524
Syphilis.....		14	5	82	97	15	10	14	49	286
Whooping cough.....		4		54	50	1		26	7	142

### FINLAND

*Notifiable diseases—May 1946.*—During the month of May 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	10	Paratyphoid fever.....	400
Diphtheria.....	746	Poliomyelitis.....	16
Dysentery, unspecified.....	10	Scarlet fever.....	216
Gonorrhea.....	1,287	Syphilis.....	548
Malaria.....	20	Typhoid fever.....	29

### JAMAICA

*Notifiable diseases—4 weeks ended June 29, 1946.*—During the 4 weeks ended June 29, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis.....	1		Poliomyelitis.....		1
Chickenpox.....	3	13	Scarlet fever.....		3
Diphtheria.....	2	4	Tuberculosis (pulmonary).....	38	68
Dysentery, unspecified.....	2	5	Typhoid fever.....		135
Erysipelas.....		1	Typhus fever (murine).....	3	
Leprosy.....		2			



## NEW ZEALAND

*Notifiable diseases—4 weeks ended June 15, 1946.*—During the 4 weeks ended June 15, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis.....	13	2	Poliomyelitis.....	8	—
Diphtheria.....	270	3	Puerperal fever.....	3	—
Dysentery:			Scarlet fever.....	130	—
Amebic.....	8	—	Tetanus.....	3	2
Bacillary.....	10	1	Trachoma.....	3	—
Erysipelas.....	21	—	Tuberculosis (all forms).....	144	59
Malaria.....	9	—	Typhoid fever.....	13	1
Ophthalmia neonatorum.....	4	—			

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*China.*—Cholera has been reported in China as follows: Shanghai, July 1–10, 1946, 784 cases, 54 deaths; Nanking, June 21–30, 1946, 3 cases; Chekiang Province, June 1–30, 1946, 96 cases, 9 deaths; Hupeh Province, June 11–20, 1946, 39 cases, 21 deaths; Kwangsi Province—Wuchow, May 21–31, 1946, 214 cases, 68 deaths.

*Malay States—Kelantan.*—For the week ended July 20, 1946, 56 cases of cholera with 42 deaths were reported in Kelantan, Malay States.

*Manchuria—Liaoning Province—Chinsi.*—During the first 2 days of July 1946, 12 cases of cholera with 12 deaths were reported in Chinsi, Liaoning Province, Manchuria.

#### Plague

*China.*—Plague has been reported in China as follows: Chekiang Province—Wenchow, June 11–20, 1946, 22 cases, 2 deaths; Fukien Province—Foochow, June 11–20, 1946, 232 cases, 66 deaths; Futsing, June 1–10, 1946, 48 cases, 27 deaths.

#### Typhus Fever

*Guatemala.*—For the month of May 1946, 77 cases of typhus fever with 11 deaths were reported in Guatemala. Departments reporting the highest incidence are: Huehuetenango, 18 cases, 3 deaths; Alta Verapaz, 16 cases; Sacatepequez, 14 cases, 1 death; Quezaltenango, 13 cases, 3 deaths.

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**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

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# Public Health Reports

VOLUME 61

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Technique for Determining Mosquito Blood Meals



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# Public Health Reports

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## TULAREMIC PNEUMONIA: TREATMENT WITH STREPTOMYCIN<sup>1</sup>

By R. L. PETERSON, *Designated Physician, United States Employees' Compensation Commission*, and R. R. PARKER, *Director, Rocky Mountain Laboratory, United States Public Health Service*

A case of tularemic pneumonia is described in which treatment with streptomycin was started immediately following diagnosis on the eleventh day of illness.

### CASE REPORT

S. M. H., a 29-year-old white male employee of the Rocky Mountain Laboratory of the United States Public Health Service, became ill on the afternoon of February 23, 1946. The onset was sudden, beginning with a chill, followed by fever, sweating, and headache. Fever, malaise, sweating, and pain in back of the eyes persisted. Cough, together with pleuritic pain, appeared on the fourth day after onset. Sputum was scant. Physical signs were not numerous, consisting of a few scattered rales throughout the left lower lung field. The temperature ranged from 99.0° F. to 104.0° F. during this time and was spiked in character. There was no photophobia, no arthralgia, and no myalgia other than lumbar aching on the day of onset. There were no skin lesions.

On March 1, 1946, the patient was hospitalized. Chest X-ray showed diffuse infiltration of the lower lobe of the left lung. The white blood count was 9,600, with an essentially normal differential count. There was scant watery sputum, without hemoptysis. The urine contained albumin and granular casts. Fifty thousand units of penicillin were given intramuscularly, followed by 25,000 units every 3 hours.

The course remained febrile, the temperature reaching 104.2° F. or more daily. Roentgenogram of the chest on March 3 showed more extensive and dense infiltration in the left lower lobe. On March 6 dullness and diminished breath and voice sounds were noted posteriorly in the left lower chest. A roentgenogram on March 8 confirmed the diagnosis of atelectasis of the left lower lobe, with displacement of the heart and trachea to the left.

On March 6, the diagnosis of tularemic pneumonia was established by laboratory tests. Penicillin was discontinued and streptomycin hydrochloride was

<sup>1</sup> From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health.

administered intramuscularly, 50,000 units every 3 hours for 18 doses. This exhausted the available supply.<sup>2</sup>

Three days later a supply of streptomycin sulfate (Abbott Laboratories) was received through the courtesy of Chester S. Keefer, chairman of the committee on chemotherapeutics, and other agents, of the National Research Council. On March 11, streptomycin therapy was resumed. The same dosage schedule previously employed was instituted and a total of one million units was administered.

The patient's response to streptomycin was dramatic. The drug was first administered at 4 p. m. on March 6; the patient's temperature was 104.4° F. at 10 p. m., but by 4 o'clock the next morning it was normal and remained so except for one rise to 99.0° F. on March 8. The pulse rate dropped from 90 and 100 to 55 and 60, and the respiratory rate likewise decreased. All subjective symptoms disappeared within 24 hours after the initial dose of streptomycin. Cough diminished, and a roentgenogram of the lung made on March 13 showed the atelectatic lobe to be reinflated. The patient was able to sit up March 12 and was discharged from the hospital March 15. He had lost 29 pounds during his illness.

The patient was able to return to work on April 1, 37 days after onset and 25 days after the initial dose of streptomycin. He gained weight rapidly. A chest film on March 22 still showed dense diffuse infiltration of the left lower lung, although there was no cough. Another film on April 26 showed resolution to be nearly complete.

#### LABORATORY TESTS

Blood samples taken on the third, ninth, eleventh, and twentieth days and a urine sample obtained on the sixth day after onset were injected into each of four guinea pigs. All animals remained well.

Sputum samples obtained on the sixth and eleventh days of illness were also tested in two groups of four guinea pigs each, two animals receiving the material intraperitoneally and two subcutaneously. Those receiving the first sample died in 3, 3\*, 5\*, and 5 days, respectively, and those receiving the second died in 3, 3, 6, and 6 days, respectively. All exhibited lesions typical or suggestive of tularemia. Portions of the two sputum samples were also injected intraperitoneally into two and four white mice, respectively. All died on the third or fourth days, their gross lesions being suggestive of tularemia. Pure cultures of *Pasteurella tularensis* were recovered from heart blood of the second and third guinea pigs of the first group. (Day of death marked with an asterisk.)

The Weil-Felix test, the agglutination test for tularemia, and complement-fixation tests for epidemic and endemic typhus, Rocky Mountain spotted fever, tsutsugamushi disease, and American Q fever were made with the four serum samples. The complement-fixation tests were negative. *Proteus* OX strains were not aggluti-

<sup>2</sup> The possible value of streptomycin for the treatment of tularemia had been suggested by preliminary tests made at the Rocky Mountain Laboratory in the spring of 1945 with infected guinea pigs. The streptomycin used was kindly furnished by Merck & Co. The experiments were terminated when the available supply of streptomycin was taken over in the early summer by the National Research Council. However, a million units, then on hand, were reserved against the possible occurrence of an infection in a member of the laboratory staff.

nated in significant titer. The test for tularemia was positive, the titers for the respective samples being as follows:

Day sample was taken	Agglutinin titers for <i>Pasteurella tularensis</i>					
	1:20	1:40	1:80	1:160	1:320	1:640
Third.....	—	—	—	—	—	—
Ninth.....	4+	4+	2+	—	—	—
Eleventh.....	4+	4+	2+	—	—	—
Twentieth.....	4+	4+	4+	4+	4+	2+

#### DISCUSSION

Foshay and Pasternack (1) have reported the successful treatment of seven cases of tularemia with streptomycin hydrochloride injected intramuscularly, treatment having been started on the third, eighth, seventeenth, twentieth, twenty-third, fiftieth, and one hundred and seventh day of illness, respectively. The dosage used in three of these cases was 30,000 units every 3 hours for 5 days (total per patient 1.2 million); in one case 30,000 units per dose for 5 days and 15,000 units for 2 more days (total 1.38 million); in one case 20,000 units per dose for 4 days (total 0.64 million); in one case 23,500 units per dose for 5 days (total 0.94 million); and in the last case, 50,000 units per dose for 2 days and 30,000 units per dose for four additional days (total 1.76 million). The last case was the one that was treated with streptomycin on the one hundred and seventh day of illness.

These authors report noteworthy relief of the distressing general symptoms before the end of the first day of treatment, and also report that this relief was striking by the end of the second day. The temperature became normal in one case by the end of the second day, in one on the third day, in one on the fifth day, in two on the sixth day, and in two others after a somewhat longer period. (Definite information is not given for one case, but the febrile period was obviously short.)

None of the cases reported by Foshay and Pasternack was tularemic pneumonia, hence, the case herein reported is of particular interest.<sup>3</sup> As previously stated, the response of this patient to streptomycin was dramatic. The temperature became normal within 12 hours after treatment was instituted, four doses having been given by that time. All distressing symptoms disappeared within 24 hours.

This patient received a total of 1.9 million units of streptomycin, 0.9 million units during the first course of treatment, and 1.0 million

<sup>3</sup> A case of tularemic pneumonia treated with streptomycin has been reported in a recent issue of the Journal of the American Medical Association (Cohen, R. B., and Lasser, R.: Primary tularemic pneumonia treated with streptomycin. J. Am. Med. Assoc., 131: 1128-1127 (Aug. 3, 1946)). The patient, a Negro, received 7,062,000 units of streptomycin over a 10-day period, beginning about the thirty-seventh day of illness, at which time the patient was considered to be moribund. Administration was both intramuscular and intravenous. The result is described as dramatic. The patient was released from the hospital on the ninety-seventh day after onset.



during the second course. It is doubtful whether the latter series was necessary. The patient had been afebrile for 3 days when the second course was started; he was showing steady improvement, and the subsequent illness did not indicate that the additional streptomycin had been beneficial.

The evidence suggests that this patient became infected by the upper respiratory route and that the involvement of the lungs was primary.

#### SUMMARY

The dramatic response of a case of tularemic pneumonia to streptomycin is reported. Treatment with streptomycin was begun on the eleventh day. Doses of 50,000 units were given every 3 hours. The patient's temperature became normal within 12 hours and all distressing symptoms were relieved within 24 hours.

#### REFERENCE

- (1) Foshay, Lee, and Pasternack, A. B.: Streptomycin treatment of tularemia. J. Am. Med. Assoc., 130:393-398 (Feb. 16, 1946).

## WINTER SURVIVAL OF *Aedes Aegypti* (L.) IN HOUSTON, TEX.<sup>1</sup>

By STEPHEN P. HATCHETT, Assistant Sanitarian (R), United States Public Health Service

### Introduction

Much has been written on *Aedes aegypti* (L.) in tropical zones, but comparatively little is known on variations of its life history in the somewhat colder regions. Rozeboom (1) has reported experiments on overwintering of eggs at Stillwater, Okla., and there are only a few other scattered data on the winter habits of this mosquito, particularly in areas where the weather during this period consists of warm days alternating with cold ones. This changeable winter weather is typical of Houston, Tex., where there are usually several periods of freezing weather and also days when the mean temperature is above 70° F. If not controlled, *Aedes aegypti* would be abundant in Houston. Therefore, the present investigation was inaugurated to ascertain the winter habits of this vector of dengue fever, so that this knowledge might be applied, if necessary, to future control procedures.

A similar study was made during the winter of 1943-44, but unfortunately it was begun rather late in the season. The present investigation was started during the middle of November 1944, prior to the onset of cold weather, and it was continued until April 1945. The winter of 1944-45 was extremely mild, inasmuch as there was but one day (December 11) of freezing weather; this condition lasted only 5 hours,

<sup>1</sup> From Malaria Control in War Areas, States Relations Division.

and the minimum temperature did not fall below 30° F. This is in contrast to the winter of 1943-44 when freezing weather occurred on five different occasions. During most of March and on 18 other days during the winter of 1944-45 the maximum temperature was 70° F. or above. Official United States Weather Bureau temperature records were used as well as readings from a maximum-minimum thermometer located in one of the experimental areas. Water temperatures were taken daily from representative containers. Approximately 15 inches of rain fell during these 4 months, which is about normal for this period.

From the onset of the study until the middle of February there was a gradual increase in the number of eggs under observation, so that during the course of the investigation approximately 10,000 eggs, procured from laboratory-reared females, had been placed under various conditions. The majority of eggs were deposited on the sides of experimental containers or on the water surface. The other eggs were laid on filter paper. The containers were placed outdoors between 36 and 72 hours after deposition of eggs, and the eggs then were treated as described below. For some groups of eggs this was an adequate incubation period, but it may not have been long enough for others. The great variation in the number of eggs that hatched per container may have been caused, in part, by the length of time eggs were left undisturbed after being laid. Observations were made on the larvae that hatched from the eggs and also on several thousand others found living in tires and other water-holding containers in two junk yards.

#### Effect of Winter Temperatures on Eggs

##### *Viability*

Eggs were placed in various types of containers under different environmental conditions, and given various treatments. In one group of containers the eggs were kept immersed throughout the winter. In another, the containers, with *Aedes aegypti* eggs attached to their inner surfaces, were filled with rain water so that the eggs were just above the water surface. Subsequent rains covered the eggs with water, which was never replenished except by normal rainfall. In this manner eggs were repeatedly immersed, but were dry during intervening periods. In a third group of containers the eggs, in accordance with Johnson's (2) statement that eggs dried soon after deposition do not hatch, were allowed to incubate about 72 hours and afterwards were kept continuously dry from the time they were set out until March 3, 1945. On this date, eggs in all groups, not already immersed, were immersed in rain water and kept under observation for hatching of larvae until April 3.

Approximately half of the containers in each group were placed in partially protected places in open sheds, under grass, etc., while the other half were placed in fully exposed situations.

The hatch of eggs kept continuously wet (43.5 percent) was considerably higher than that of the eggs intermittently dried or dried for one continuous period (28.4 percent and 21.4 percent, respectively) (table 1). As can be seen from table 1 there is a great variation in the number of eggs that hatched in individual containers in all three groups. However, the hatch in 14 of the 18 containers with continuously wet eggs fell between 16.5 percent and 67.4 percent (average 39.5 percent), whereas in 25 of the 28 containers dried intermittently or continuously before final immersion of eggs, the hatch fell between 5 percent and 53 percent (average 21.9 percent). If all containers are considered there is still a significant difference between the percentage of larvae hatched from eggs continuously wet and those dried for any length of time.

TABLE 1.—*Viability of eggs exposed to winter temperatures*

Treatment of eggs	Number of containers	Total number of eggs	Range of percent hatched	Total percent hatched
Continuously wet:				
Fully exposed.....	10	1,650	1-95	35.2
Partially protected.....	8	1,565	16.5-75.6	52.8
Total.....	18	3,215	1-95	43.5
Intermittently wetted by rain:				
Fully exposed.....	7	1,050	5-53	24.8
Partially protected.....	8	1,000	9-65	31.2
Total.....	15	2,050	5-65	28.4
Dried 22-109 days:				
Fully exposed.....	7	1,017	6.6-78.5	17.7
Partially protected.....	6	1,063	11.3-89.8	25.0
Total.....	13	2,080	6.6-78.5	21.4
Grand total.....	46	7,395	.....	32.7

The length of the drying period did not appear to influence the viability of eggs if they were dried at all, for more eggs hatched from the container dried for the longest time (109 days) than from any other; on the other hand the fewest eggs to hatch in any container were in a container dried for 102 days. Le Van (3) found that *Aedes aegypti* eggs dried for a year still hatched, and Bacot (4) reported some eggs hatched after drying for 15 months.

In all three groups the hatch is lower in the fully exposed containers than in the partially protected ones (table 1). The average hatch in all the fully exposed containers considered together was 29.5 percent, whereas in the partially protected containers it was 38.5 percent. The combined effect of continuous immersion and partial protection as compared with intermittent or continuous drying and full exposure increased the average hatch per container from 25.5 percent to 50 percent. Regardless of treatment, the size and type of container appear to have had little influence on the viability of eggs during

the winter of 1944-45. The volume of water in a receptacle probably would have had more influence if there had been longer or more severe spells of cold weather.

In addition to observations on the above-mentioned containers, observations were also made on eggs deposited under natural conditions in barrels, tires, and other large receptacles. However, it was not possible to ascertain even the approximate number of eggs on the sides of these containers, and nothing was known about the time of their deposition. Therefore, they have not been considered in the above data, but the results were similar.

Since there was only one short period of freezing weather during the winter of 1944-45, a series of experiments was performed on the effects of artificial cold on *Aedes aegypti* eggs. These eggs were 48 to 72 hours old at the onset of the experiments and were all laid within a 24-hour period by females in one rearing cage. The results obtained are shown in table 2. Temperatures higher than 34° F. were not

TABLE 2.—*Effect of artificial cold on eggs of Aedes aegypti (L.)*

Container No.	Treatment			Number eggs hatching at intervals after exposure						
	Hours dry	Ex-posed to cold	Hours cold	24 hours	48 hours	96 hours	144 hours	192 hours	250 hours	Total number
1.....	48	34	24	0	0	4	16	1	21	42
2.....	48	26	24	0	1	4	1	4	0	10
3.....	48	26	48	0	0	0	0	0	0	0
4.....	48	Room temperature as control		0	3	16	26	18	11	73
5.....	0	34	24	7	8	2	1	11	26	55
6.....	0	26	24	0	0	0	0	0	0	0
7.....	0	26	48	0	0	0	0	0	0	0
8.....	0	Room temperature as control		16	13	48	3	6	0	86

1 100 eggs per container.

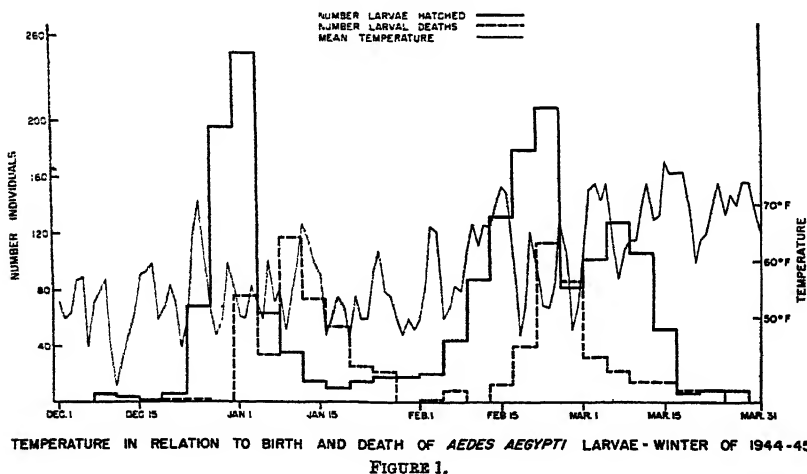
2 Degrees Fahrenheit.

effective deterrents on the subsequent hatching of eggs, and therefore are not included in the table. All eggs in these experiments, except the controls, were subjected to artificial cold in an electric refrigerator for varying periods and temperatures, after which they were returned to room temperature for further observation. No eggs hatched while in the refrigerator. Half of these eggs were dried for 48 hours and were then immersed in rain water just prior to exposure. The other eggs were kept continuously wet. Exposure to 34° F. for 24 hours reduced the number that hatched by about 40 percent in both groups. In both the controls kept at room temperature and those exposed to 34° F. the eggs previously dried were slower in hatching than the eggs kept continuously wet. Exposure to 26° F. for 24 hours reduced the hatch of the previously dried eggs to 10 percent, while none of the continuously wet eggs survived this exposure. No eggs in either group hatched after exposure to 26° F. for 48 hours.

This is in agreement with early experiments of Bacot (5), but Davis (6) reports that a few eggs hatch after a 48-hour exposure to  $-5.5^{\circ}\text{C}$ . ( $22^{\circ}\text{F}$ .).

### Time of Hatching

Although some eggs hatched nearly every day from December 7 through March 15 (fig. 1), the number hatching at any one time was markedly influenced by the temperature. There were only three periods (December 25–27, February 12–15, March 1–4) during the winter when the mean temperature was  $70^{\circ}\text{F}$ . or above, and immediately following these periods there was an acceleration in the hatching of eggs. Although the mean temperature during the first 2 weeks of February did not reach  $70^{\circ}\text{F}$ . until the 12th, there was a gradual rise in the temperature during this period, and along with



this rise there was a corresponding increase in the number of eggs that hatched. However, this particular spurt in hatching of eggs reached its maximum after the mean temperature was above  $70^{\circ}\text{F}$ . Few eggs hatched when the mean temperature dropped below  $50^{\circ}\text{F}$ . During most of January the mean temperature fluctuated a great deal from day to day, but seldom averaged as high as  $60^{\circ}\text{F}$ . As a result of this, few eggs hatched during this month. Although the mean temperature did not drop below  $60^{\circ}\text{F}$ . after the first week in March, few eggs hatched. This was because most of the viable eggs had already hatched.

In spite of the mild weather prevailing during the winter of 1944–45, the temperature was low enough to retard the hatching of eggs to a considerable degree. Under optimum conditions, the majority of newly laid *Aedes aegypti* eggs hatch within a week after immersion. In contrast to this, during this particular winter only a few eggs hatched after being immersed a week, although early in the winter some eggs

hatched after 48 hours of immersion (table 3). On the other hand, some eggs were continuously immersed for as long as 64 days before the first larva appeared, and in several batches over 90 days of immersion elapsed before the last eggs hatched. It is possible that if these observations had continued beyond the first week of April even longer prehatching periods would have been observed. In general, the majority of eggs in an individual set hatched within a short interval of each other. However, in most batches one or two eggs hatched

TABLE 3.—*Days Aedes aegypti eggs were immersed before hatching, winter 1944-45*

Treatment of eggs	Immersion dates	Number of containers	Days immersed before hatching					
			Maximum range	Maximum average	Mean range	Mean average	Minimum range	Minimum average
Continuously wet.....	1944 Nov. 27-Dec. 30.....	6	69-92	80	12-73	40	2-64	20
	1945 Jan. 8-Jan. 22.....	6	36-48	43	29-36	31	20-30	25
	Feb. 9-Feb. 22.....	6	21-41	30	10-23	16	3-18	10
Dried 1-16 days.....	1944 Dec. 1-Dec. 30.....	3	20-93	57	18-68	43	15-60	38
	1945 Jan. 8-Jan. 18.....	5	41-57	50	25-50	36	15-48	31
	Feb. 9-Feb. 22.....	5	22-70	36	14-28	19	5-12	7
Dried 30-109 days.....	1944-45 Nov. 27-Feb. 22.....	7	20-95	81	26-54	40	13-46	33
All containers.....	Nov. 27-Feb. 22.....	38	20-95	52	10-73	28	2-64	19

earlier than the others. It appears from the data in table 3 that most of the delayed hatching occurred in groups of eggs that were immersed most of the winter, whereas eggs that were immersed in February, after the weather had become milder, hatched more quickly. There is a definite gradation with advancing dates of immersion in maximum as well as average and minimum prehatching immersion periods. This is apparent for wet eggs as well as eggs dried for as long as 16 days.

#### Effect of Winter Temperatures on Larvae and Pupae

In the previous section it was shown that the temperature had a definite influence on the hatching of *Aedes aegypti* eggs. A similar relationship, although not as apparent, was found between the mean temperature and time a larva took to complete its development, pupate, and then emerge as an adult. This correlation has been ascertained by others under experimental controlled conditions; e. g., Shannon and Putman (7), Headlee (8), (9), (10), Chandler (11), and others. In nature, however, the temperature fluctuates a great deal and in a manner difficult to duplicate experimentally, so the observations of Headlee (9) and others were repeated but under natural outdoor conditions as they existed in Houston during the winter of 1944-45.

There is a wide range in periods of time necessary for different batches of larvae to complete their development, even under rather similar temperature conditions. Of 34 batches on which data are available, the minimum period for development ranged from 7 to 24 days except in one instance in which it was 40. This was the only case in which the mean temperature for the period was below 60° F. (58° F.). However, at 69° F. the minimum period varied from 10 to 23 days. The maximum period for development varied from 15 to 59 days. In six instances for which the temperature for the maximum periods fell below 58° F., this period was from 39 to 59 days. On the other hand in nine instances in which the mean temperature for the maximum periods was 65° F. or above, this period was from 15 to 28 days.

Headlee (10) found that when the temperature remained constantly lower than 60° F. larvae were not able to complete their development, but if it varied from 55° F. to 65° F., 15 percent of the larvae would become adults within 55 days. The results in the field experiments quoted above are not entirely in conformity with Headlee's laboratory observations, since in two different instances adults were produced at mean temperatures as low as 53° F. The actual average temperature for the periods in question may, of course, have been higher than the recorded mean temperature, since the latter is only a mean of the maximum and minimum for each day. The presence of abundant food (yeast) in the above cases may have been one of the determining factors in survival under these conditions. Approximately 42 percent of these slow-maturing larvae mentioned above became adults, but only 2 of the 43 specimens were females, and these died 4 days after emergence, never having fed on blood. The adults from larvae that took over 30 days to complete their development seldom fed on blood, and usually died shortly after emerging. Several of these slow-maturing larvae were not able to emerge from the pupal cases and died in the attempt. Usually less than 50 percent of the slow-maturing larvae ever became adults. More adults were obtained from batches of larvae in which the range in time taken to complete development was small.

There were two periods in the course of their development when larvae were particularly susceptible to unfavorable conditions. One of these was from the time larvae leave the egg until they undergo the first molt. This may be seen in figure 1, where the curve on larval deaths lags less than a week behind the curve depicting the number of larvae that have hatched within a 4-day interval. A second period of high mortality was during the final molt, after which the individual became a pupa. However, not as many specimens died at this time as during the first instar. Temperatures below 50° F. were particularly hard on larvae in these two developmental stages. Larvae in

other phases of development were better able to survive the cold. In all instances, however, the amount of detritus on the bottom of the container materially aided in the survival of all individuals in all developmental stages when a cold spell came.

Under the winter conditions of 1944-45 the temperature had little effect on duration of the pupal stage. In general, pupae appeared 2 to 3 weeks after the eggs hatched. Frequently during the last week of January and the first week of February the minimum temperatures at night would suddenly fall below 50° F., but the days were warm. It was during this period that many individuals were pupating during the warm afternoons, or emerging as adults. Sudden changes in temperature at this time resulted in the death of many specimens in these molting groups. The adults were caught when only partially out of the pupa cases. The above-mentioned 2-week period, however, was the only time when pupae were killed in significant numbers.

#### Effect of Winter Temperatures on Emergence of Adults

The number of adults that emerged at any one time depended on the patterns set by the hatching of larvae. The majority of adults usually appeared 2 to 4 weeks later. The first adult (a male) emerged on the afternoon of January 26, but died 2 days later. The great majority of adults that emerged up to the middle of February did not live very long. However, a very few females did take blood meals and subsequently laid eggs. On the other hand, most of the adults that emerged after the middle of February were able to survive the cold nights (minimum 43° F.). A majority of these females fed on blood and laid eggs. These adults were in screened cages (36" x 18" x 18") placed on the south side of a small shed on the ground. Several gallon paint cans were laid on their sides in the cages to afford shelter and protection.

In February it was possible to ascertain the sex of emerging adults since each jar was screened. The ratio of males to females from late January through February was approximately three to one. During March, containers with pupae in them were placed in cages so that adults from these receptacles became mixed, and newly emerged adults could not be easily separated from the older ones.

From the 1,883 larvae that were under very close observation throughout the winter, 985 (52 percent) became adults. The shift in the entire *Aedes aegypti* population from egg to larva to pupa to adult is illustrated in figure 2. Living larvae and living pupae are shown only for a specific time interval. However, dead larvae and pupae are shown cumulatively so that all individuals that hatched were accounted for on April 3, when the last adult emerged. During the middle of January many larvae died, so that only 17 percent of individuals hatching prior to February 15 became adults. Shortly after the first of March the weather warmed noticeably and after this few



deaths of immature individuals occurred. In considering the entire period from February 15 to April 1, 56 percent of the immature population became adults. After the middle of March few eggs hatched, so that by the first week in April all members of this population had either died or become adults and none were larvae or pupae.

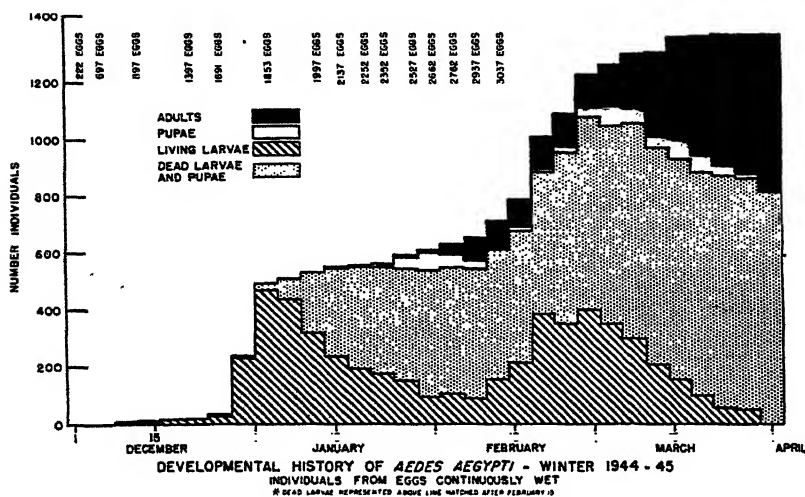


FIGURE 2.

### Discussion and Summary

Houston usually has several periods of freezing weather. However, as previously mentioned, the winter of 1944-45 was rather atypical in this respect, and the results obtained from this investigation should be interpreted with this in mind.

Specific conclusions are difficult to make, since there were a great many variations in different containers, and the reasons for these are not completely known. The present investigation corroborates some of the data obtained during the previous winter and in other instances extends information obtained that season.

From the data obtained during the course of this investigation in Houston the following conclusions may be made.

1. Over 40 percent of the eggs hatched that had been continuously wet all season. In contrast to this, during the 1943-44 season when winter conditions were more severe, approximately 25 percent of the continuously wet eggs hatched.

2. During both seasons less than 30 percent of the eggs hatched that remained dry until winter conditions no longer existed and were then immersed. Approximately the same percentage applies to eggs intermittently dried between rains. Eggs stored in partially protected places, whether wet or dried, tended to produce somewhat larger hatches than those left in fully exposed situations.

3. Many eggs hatched when the mean temperature was 70° F. or over. However, there were some eggs hatching throughout the entire winter, although very few hatched when the mean temperature was below 50° F. In the 1943-44 season no eggs hatched when the mean temperature fell below 45° F.

4. A few eggs hatched approximately 48 hours after they were placed outdoors. These eggs were probably over 18 hours old when removed from the indoor cage where they were deposited. On the other hand, some eggs did not hatch until 90 to 95 days of immersion had elapsed.

5. The mean period of immersion before hatching was about 32 days.

6. Eggs that had been continuously wet since time of deposition did not survive artificial cold of 26° F. when it lasted 24 hours or longer. However, 10 percent of the eggs hatched that previously had been dry and were then immersed in cold water and frozen at this temperature for 24 hours. Approximately half of all eggs hatched that were previously exposed to artificial cold of 34° F. for 24 hours.

7. During both winters, larvae were better able to survive cold weather when there was a layer of organic matter on the bottom of the container.

8. Larvae that have just emerged from eggs, and old larvae preparing to pupate, are more susceptible to sudden chilling than others.

9. During the entire season approximately half of the larvae under observation became adults. But previous to February 15, less than 20 percent of them became adults.

10. The period from hatching to emergence of adults ranged from 7 to 59 days. Most specimens took 2 to 3 weeks to complete their development and emerge as adults.

11. The death rate of slowly maturing larvae was high. Most adults whose immature development was slow were weak, and many died within 2 to 3 days after emergence.

12. The mean pupal period during this winter was 4 days. No individual lived that remained as a pupa for more than 10 days.

13. Most females that emerged after the middle of February lived at least long enough to mate, feed on blood, and oviposit.

14. The size of the container had little if any influence on the survival of eggs, larvae, or pupae.

15. In view of the above data, it would appear that for control during mild winters, special emphasis should be placed on the elimination of all small receptacles, since many possibly would have viable eggs adhering to their inner surfaces, and some of these eggs may remain dry or even wet for long periods and still hatch and develop into adults.

#### Acknowledgment

This investigation was undertaken at the suggestion of Dr. Asa C. Chandler, Special Consultant for the *Aedes aegypti* Division of the Office of Malaria Control in War Areas, and the author is grateful for his advice and counsel. The cooperation of the men of the *Aedes aegypti* project in Houston is also appreciated.

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## PRECIPITIN TECHNIQUE FOR DETERMINING MOSQUITO BLOOD MEALS<sup>1</sup>

By E. H. ARNOLD, *Passed Assistant Engineer (R)*; S. W. SIMMONS, *Sanitarian (R)*; and DOROTHY G. FAWCETT, *Junior Assistant Sanitarian (R)*; *United States Public Health Service*

The importance of a given species of *Anopheles* as a malaria vector depends largely upon its feeding habits, the important vectors throughout the world being those which feed most consistently on man. In any given locality, often only one species of *Anopheles* is primarily responsible for malaria transmission. By concentration of control efforts upon this species, a great deal of time, labor, and money may be saved. This procedure is commonly called "species sanitation."

To add more light to information concerning the malaria and potential malaria vectors in this country, and to determine whether there are seasonal, geographic, or species variations in host preferences, the feeding habits of our American *Anopheles* are being studied. This study involves use of the precipitin test to determine the source of the mosquito blood meal.

### COLLECTION OF MOSQUITO SPECIMENS

The specimens are collected by local MCWA inspectors during the course of routine inspections, and are forwarded to the Henry R. Carter Memorial Laboratory of Savannah, Ga., for testing. The collectors are instructed to select only freshly engorged females, with swollen red abdomens, indicating that they have had recent blood meals. Specimens are collected in the morning to minimize digestive action on the blood, and are taken from a variety of natural and artificial resting places.

As soon as collected, each specimen is crushed on an individual filter paper, upon which is recorded data as to general locality, specific collection place, species of mosquito, distance from nearest continually

<sup>1</sup> From Malaria Control in War Areas (Henry R. Carter Memorial Laboratory), States Relations Division.

available source of human blood, whether such is screened or not, name of collector, and date. The specimens are then submitted to the laboratory by mail, on the day they are collected.

Figures 1 and 2 show data sheets on which the information sub-

OFFICE OF  
U. S. PUBLIC HEALTH SERVICE  
MALARIA DIVISION

## ANOPHELES HOST PREFERENCE STUDIES

DAILY WORK SHEET

CARTER MEMORIAL LABORATORY - SAVANNAH, GEORGIA

STATE GeorgiaAREA 2

NUMBER	TOWN	DATE COLLECTED	COLLECTION PLACE	COLLECTOR	SPECIES	DIST OF SPEC FROM HAB (MILES)	RESULTS										REMARKS
							H	E	S	P	A	N	U				
1	Example	8-30-45	Shed	J. Doe	A. quad.	20-5	+										
2	"	"	"	"	"	"		+									
3	"	"	"	"	"	"		+									
4	"	"	"	"	"	"	+										
5	"	"	"	"	"	"				+							
6	"	"	"	"	"	"			+								
7	"	"	"	"	"	"					+						
8	Grenada	9-3-45	Barn	Ebbitt	A. cres.	40-0	+										
9	"	"	"	"	"	"		+									
10	"	"	"	"	"	"		+									
11	"	"	"	"	"	"			+								
12	"	"	"	"	"	"								+	guan. ins.		
13	"	"	"	"	"	"				+							
14	"	"	"	"	"	"								+			
15	"	"	"	"	"	"				+							
16	"	"	"	"	"	"			+							weak	
17	"	"	Privy	"	A. quad.	30-0	+										
18	"	"	"	"	"	"				+							
19	"	"	"	"	"	"				+							
20	"	"	"	"	"	"				+							
21	"	"	"	"	"	"				+							
22	"	"	"	"	"	"						+					
23	"	"	"	"	"	"					+						
24	"	"	"	"	"	"	+										

+ - BOWIE    - - NEGATIVE

FIGURE 1.—*Anopheles* host preference studies. Daily work sheet.

## ANOPHELES HOST PREFERENCE STUDIES

HOST AND HABITATION SUMMARY SHEET

CARTER MEMORIAL LABORATORY - SAVANNAH, GEORGIA

STATE <u>Georgia</u>	MONTH <u>September</u>	SPECIES <u>A. quad.</u>	PLACE OF COLLECTION	NUMBER OF SPECIMENS FEEDING ON					
				HUMAN	BOWIE	BOVINE	PORCINE	AVIAN	NO REACTION
			BARN	52	76	318	62	49	60
			BARN-COW	3	10	112	19	11	13
			BARN-HORSE						
			BARN-HAUL						
			BRIDGE	3	4	12	1		1
			CHICKEN-COOP	24	24	171	56	155	57
			CULVERT			5		15	
			FEED BINS						
			BARABE			1			
			HOUSE	9	13	49	4	12	11
			HOUSE-VACANT						
			HOUSE-BASEMENT						
			PIG STY						
			PRIVY	30	46	372	74	23	43
			MISCELLANEOUS SHELTERS	24	27	266	22	41	56
			OUTDOOR GATHERING PLACES			14	2	1	2
			TOTAL NUMBER OF SPECIMENS	145	200	1814	315	226	244
			PERCENT OF TOTALS	6.00	8.25	50.30	13.05	12.26	10.11
			A-SPECIMEN WITHIN 1 MILE OF SCREENED HABITATION	NUMBER 117	154	976	169	263	191
			PERCENT 6.24	8.21	52.02	9.01	14.34	10.18	
			B-SPECIMEN WITHIN 1 MILE OF UNSCREENED HABITATION	NUMBER 28	46	236	45	27	51
			PERCENT 6.49	10.72	27.63	10.72	6.25	11.30	
			C-DISTANCE OF SPECIMEN FROM HABITATION UNKNOWN	NUMBER 1	2	1			2
			PERCENT 16.67	33.33	16.67			33.33	

FIGURE 2.—*Anopheles* host preference studies. Host and habitation summary sheet.

mitted with the specimen, and results, are recorded. The daily work sheet is used to record collection information and the blood meal determinations of the individual specimens as they are tested. The host and habitation summary sheets are the ones at present being used to summarize data by months for the particular regions concerned, in relation to the collection place.

To date a total of over 150,000 specimens have been tested including the following species: *A. quadrimaculatus*, *A. pseudopunctipennis*, *A. punctipennis*, *A. albimanus*, *A. crucians*, *A. freeborni*, and *A. punctulatus*.

#### THE PRECIPITIN TEST

The Rice and Barber <sup>2</sup> modification of the Uhlenhuth-Weidanz precipitin test was used. With this technique, 1 cc. of each animal antiserum is sufficient to run approximately 200 to 250 tests in duplicate, and one person is capable of running this number per day.

*Preparation of antisera.*—Antisera for man, horse, cow, hog, and chicken are used. The antisera are prepared at the laboratory by injection of normal serum into rabbits, which receive intravenous injections totaling 3.7 cc.

Injections are given at 3-day intervals, and are as follows: 0.2 cc., 0.5 cc., 0.5 cc., 0.75 cc., 0.75 cc., and 1.0 cc. Each rabbit receives only four injection series, being allowed a rest period of from 3 to 4 weeks between bleedings and the beginning of a new injection series. The animal receives a desensitizing dose of 0.001 cc. blood serum diluted in a convenient quantity of saline, 2 or 3 days prior to beginning the last three injection series, which are as previously outlined. Eight to twelve days after the last injection of the series, approximately  $\frac{1}{2}$  cc. of blood is taken from the marginal ear vein of the rabbit and the titer determined. Only antiserum titering above 1:5,000 is used. At this time the remaining portion of the antiserum sample is diluted with a mixture consisting of one part glycerine to two parts normal saline, to produce final antiserum concentrations in the diluent of 1 plus 7, 1 plus 14, and 1 plus 28. This antiserum diluent mixture is checked against 1:500 dilutions of the antigen by means of capillary tube cards described below. In instances where the antiserum fails to meet requirements, boosting injections of normal serum may be given; the dosage depending upon the titer present.

The minimum requirement is an easily visible reaction at the interface of the antiserum and antigen, in the 1 plus 7 dilution. In many cases it will be possible to dilute the antiserum to 1 plus 14 or more. If the above requirements are met, the rabbit is bled from the heart, taking from 30 to 60 cc. depending upon the size of the animal. The

<sup>2</sup> Rice, J. B., and Barber, M. A.: Malaria studies in Greece. A modification of the Uhlenhuth-Weidanz precipitin test for determining the sources of blood meals in mosquitoes and other insects. *J. Lab. and Clin. Med.*, 28: 876-883 (1935).

blood is allowed to clot in centrifuge tubes; the clot is broken and centrifugated. The antiserum recovered is diluted with an equal volume of glycerine and stored in a refrigerator at approximately 40° F. until used.

In preparation for the test, one part of the 1:1 mixture of glycerine and antiserum is added to three parts of a diluent consisting of one part of glycerine in 6½ parts of normal saline. The diluted antiserum is checked previous to starting a day's run, by checking it against 1:100 and 1:500 dilutions of known normal serum. This is for ascertaining if the antiserum has maintained its potency, that no chance contamination has occurred, and that the test is producing clearly discernible reactions. Usually the antiserum produces an easily discernible reaction at the above dilutions, and in many cases it may be possible to dilute the antiserum further, as indicated by the controls.

No cross reactions have been observed with the antiserum as prepared. Tests for "group" reactions by checking various lots of antisera against related animals have been made. These tests have been limited in scope, but the following is a list, first of the antiserum and then of bloods for which that antiserum has given a positive reaction with the test as performed: Horse, mule; cow, sheep, deer, goat; chicken, pigeon, duck, sparrow.

*Preparation and testing of blood samples.*—Specimens received from the field are held in the refrigerator until they are examined. Before testing the blood sample, the mosquito identification is checked, the data accompanying the specimen are recorded, and the blood spot is cut out of the piece of filter paper, and placed in the compartment of an especially constructed tray (fig. 3). The blood is extracted from the filter paper with physiological saline (2 to 3 cc.) and then is allowed to settle to insure obtaining a clear supernatant fluid for the test. The antigen (diluted stomach blood) is picked up by capillarity in five glass tubes (1.5 mm. inside diameter) cemented into a unit between glass slides and referred to as a card (fig. 3). The antigen rises in the tubes to a height of approximately 1½ cm. The unit is then touched to a pad of absorbent cotton, which is wet with physiological saline and overlaid with a blotter, which draws away from one-third to one-half of the antigen, and wipes the bottom of the tubes (fig. 4). The blotter and cotton are best placed in a large tray of approximately 12 x 12 inches. The cards should be touched first at the distal end of the tray and proceed successively toward the operator, so that no two sets of tubes are blotted in the same position, which will provide a safeguard against contamination. The antiserum is placed in small shell vials, five vials being mounted side by side, each containing a different antiserum, and each of the capillary tubes with one motion is brought into contact with a different anti-

serum (fig. 5). The antiserum flows into the capillary tube, bringing the total height of liquids in the tube to approximately the original level. The unit now has a layer of each animal antiserum under the one antigen, which consists of the diluted blood from one mosquito stomach. The reaction, consisting of a precipitate at the interface of the two liquids, often appears in the appropriate tube within a very few minutes.

*Reading results.*—After 30 minutes of incubation at room temperature, the reactions are read with the aid of a magnifying glass mounted in an illuminated reading box (fig. 6). The reaction appears in the form of a biconvex lens at the interface of the antigen and antisera. It is necessary that the units of cards should not be agitated previous to reading, in order not to disturb the lens. A diffuse reaction might appear in the region of the interface rather than the narrow, sharp, easily recognized, positive one.

*Precautions.*—It is necessary, as with all precipitin work, to be careful and precise in performing the test. Care is particularly necessary with a technique such as this, since it is routine, and becomes tedious after some time has been spent at the work.

The cleaning of the cards of capillary tubes is very important. They are suspended in sulphuric-bichromate solution overnight, and are then shaken free of the solution, washed in water containing a wetting agent, and then thoroughly washed with tap water. Afterwards the cards are suspended in a large dish of distilled water, where they are left until used. It is essential that all of the acid be removed from the units, since its presence, even in small amounts, is likely to cause a nonspecific precipitation of the antiserum. The washing procedure used above is considered reliable. However, the units are randomly sampled, and tested with litmus paper before use, as a check on their cleanliness.

All tests should be made in duplicate, and all doubtful reactions discarded unless the material is particularly valuable. Specimens are submitted in abundance, so that here only clear, positive reactions are considered. The purpose of the feeding habit survey does not require the identification of meals which are scanty or otherwise inadequate.

The technique has been checked repeatedly by comparing results with those obtained when the same series is conducted in test tubes. The results of examination by the two methods agree very closely, the test tube method being perhaps a bit more sensitive, but requiring more time and materials.

The diluted antiserum in the row of glass vials is dipped until all is used. No evidence has been found to indicate that the test is impaired by this procedure or that contamination occurs. Touching the unit of tubes to the blotter removes any excess antigen before

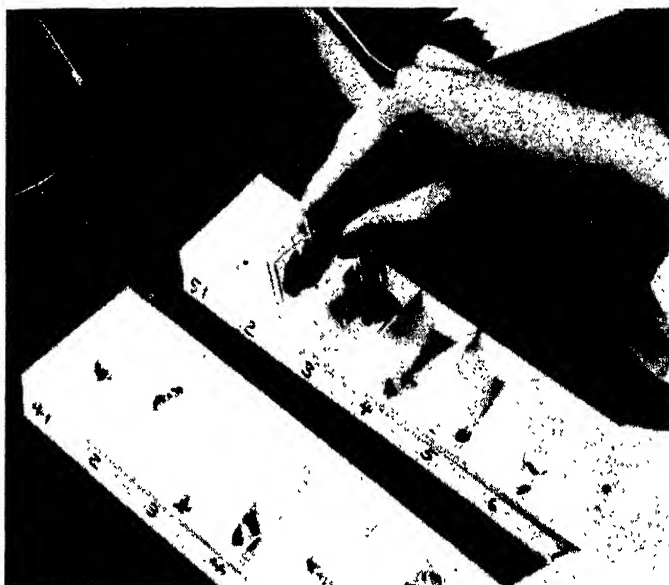


FIGURE 3.—Dipping capillary tubes into antigen, consisting of extract of mosquito blood meal.



FIGURE 4.—Blotting capillary tubes containing antigen on cotton and filter paper wet with saline.





FIGURE 5.—Dipping card of capillary tubes simultaneously into vials containing human, equine, bovine, porcine, and avian antiserums, and placing them in incubation racks.

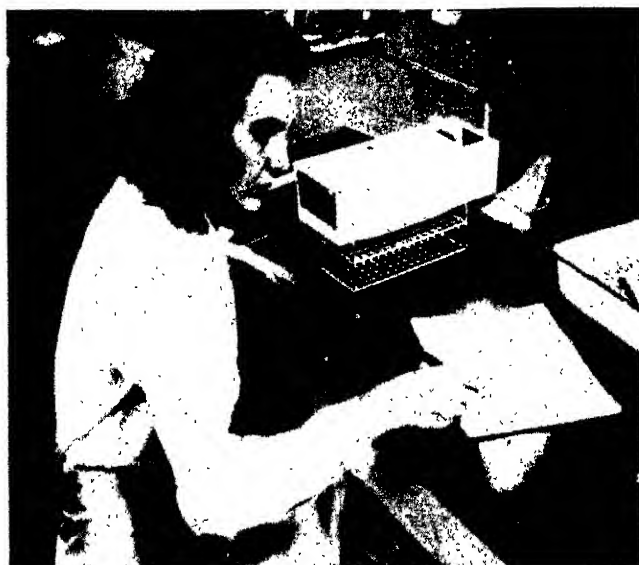


FIGURE 6.—Reading and recording results.

dipping. The flow of the precipitin serums into the tubes apparently prevents any mixture of antigen and antisera in the vials, which are checked frequently for cloudiness.

### DEATHS DURING WEEK ENDED JULY 27, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 27, 1946	Correspond- ing week, 1945
Data for 93 large cities of the United States:		
Total deaths.....	8,256	8,346
Average for 3 prior years.....	8,243	
Total deaths, first 30 weeks of year.....	281,522	276,166
Deaths under 1 year of age.....	670	623
Average for 3 prior years.....	640	
Deaths under 1 year of age, first 30 weeks of year.....	18,768	18,242
Data from industrial insurance companies:		
Policies in force.....	67,234,427	67,384,931
Number of death claims.....	11,437	12,304
Death claims per 1,000 policies in force, annual rate.....	8.9	9.5
Death claims per 1,000 policies, first 30 weeks of year, annual rate.....	10.0	10.7

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED AUGUST 3, 1946

#### Summary

A total of 1,284 cases of poliomyelitis was reported for the week, as compared with 911 last week and a 5-year (1941-45) median of 450. The largest number previously reported for a corresponding week was 1,029, reported for the week in 1931. Increases occurred in all geographic divisions except the South Atlantic and East South Central, but were largest in the East and West North Central areas. Of the 37 States reporting currently 5 or more cases, 18 showed increases of 5 or more cases, as follows (last week's figures in parentheses): Massachusetts 11 (4), New York 43 (30), New Jersey 14 (5), Ohio 44 (38), Illinois 117 (66), Michigan 46 (13), Wisconsin 30 (18), Minnesota 257 (188), Iowa 50 (17), Missouri 77 (38), North Dakota 31 (11), South Dakota 23 (5), Nebraska 38 (33), Kansas 80 (36), Virginia 12 (6), Arkansas 30 (18), Colorado 63 (48), California 60 (52). In States reporting currently 5 or more cases, decreases occurred in Pennsylvania (11 to 9), Georgia (16 to 8), Florida (20 to 17), Alabama (17 to 14), Mississippi (25 to 9), Oklahoma (33 to 28), Texas (52 to 43), and Oregon (9 to 5). The cumulative total is 5,455, as compared with 2,913 for the period last year, 3,992 in 1944, and a 5-year median of 2,766.

Of a total of 230 cases of diphtheria, as compared with 164 last week and a 5-year median of 169, Texas reported 29 (last week 15), California 20 (last week 18), New York 17 (last week 7), and Michigan 15 (last week 4).

Of 19 reported cases of infectious encephalitis, as compared with 15 last week, 14 occurred in California, and of 165 cases of typhoid and paratyphoid fever, as compared with 146 last week, Texas reported 31 (last week 7) and Virginia 14 (last week 4).

A total of 7,986 deaths was recorded for the week in 93 large cities of the United States, as compared with 8,266 last week, 8,152 and 8,140, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,191. The total for the year to date is 289,518, as compared with 284,318 for the same period last year.

*Telegraphic morbidity reports from State health officers for the week ended Aug. 3, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Aug. 3, 1946	Aug. 4, 1945		Aug. 3, 1946	Aug. 4, 1945		Aug. 3, 1946	Aug. 4, 1945		Aug. 3, 1946	Aug. 4, 1945	
NEW ENGLAND												
Maine.....	2	0	0	—	—	—	30	1	27	0	0	0
New Hampshire.....	0	0	0	—	—	—	3	—	3	0	1	0
Vermont.....	0	0	0	—	—	—	71	9	17	0	0	0
Massachusetts.....	9	3	3	—	—	—	210	95	95	0	3	8
Rhode Island.....	1	0	1	—	—	—	11	—	10	1	2	1
Connecticut.....	1	0	0	—	—	1	85	8	18	0	1	1
MIDDLE ATLANTIC												
New York.....	17	8	6	11	—	—	387	36	176	6	17	17
New Jersey.....	4	1	1	2	—	2	104	31	49	2	6	6
Pennsylvania.....	8	2	6	—	1	—	150	94	57	6	4	4
EAST NORTH CENTRAL												
Ohio.....	4	8	4	—	—	3	167	15	46	2	5	2
Indiana.....	4	8	4	—	6	4	8	7	7	0	0	0
Illinois.....	7	2	7	—	7	4	48	89	50	6	3	3
Michigan <sup>1</sup> .....	15	8	3	—	—	—	107	29	57	2	5	5
Wisconsin.....	4	5	1	—	6	5	154	43	109	1	5	3
WEST NORTH CENTRAL												
Minnesota.....	4	2	2	—	—	—	20	2	9	2	0	0
Iowa.....	0	0	3	—	—	—	20	8	18	1	1	1
Missouri.....	1	2	3	—	—	—	12	17	17	0	4	4
North Dakota.....	0	3	1	20	—	—	1	—	3	1	0	0
South Dakota.....	1	0	1	—	—	—	1	6	6	1	0	0
Nebraska.....	0	2	1	3	—	—	1	2	2	1	2	0
Kansas.....	1	8	2	—	—	—	5	9	15	1	3	2
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	—	1	1	1	0	0
Maryland.....	6	7	3	—	—	1	64	2	31	0	2	4
District of Columbia.....	0	0	0	—	—	—	19	—	7	0	1	1
Virginia.....	11	4	7	99	30	35	51	7	11	1	2	2
West Virginia.....	1	12	2	—	20	—	9	—	9	1	1	1
North Carolina.....	9	18	9	—	—	—	24	2	11	2	2	2
South Carolina.....	4	8	4	72	57	70	22	10	17	0	1	2
Georgia.....	6	5	9	—	2	6	13	2	6	0	1	1
Florida.....	3	5	3	1	—	4	7	5	5	0	1	1
EAST SOUTH CENTRAL												
Kentucky.....	5	2	2	—	—	—	6	6	6	0	1	1
Tennessee.....	2	4	3	1	6	6	10	4	6	2	7	2
Alabama.....	2	7	7	17	31	9	11	—	7	1	2	2
Mississippi <sup>2</sup> .....	9	7	4	—	—	—	—	—	—	5	2	2
WEST SOUTH CENTRAL												
Arkansas.....	4	4	4	—	8	3	6	13	9	1	3	0
Louisiana.....	4	17	3	—	4	3	8	23	5	0	6	1
Oklahoma.....	5	2	2	10	12	7	21	3	4	0	4	1
Texas.....	29	47	25	233	360	190	109	52	54	2	10	5
MOUNTAIN												
Montana.....	0	1	1	—	5	3	10	2	2	0	0	0
Idaho.....	0	0	0	17	3	—	9	17	21	0	1	0
Wyoming.....	0	0	0	—	1	2	3	2	2	0	0	0
Colorado.....	9	4	4	3	9	9	6	4	13	0	0	0
New Mexico.....	0	6	1	1	1	—	3	3	4	0	0	0
Arizona.....	3	1	1	8	25	22	22	4	10	0	0	0
Utah <sup>1</sup> .....	0	0	0	1	—	—	20	78	22	0	0	0
Nevada.....	0	0	0	—	—	—	1	—	11	0	0	0
PACIFIC												
Washington.....	12	3	4	—	—	0	21	65	46	1	2	2
Oregon.....	3	4	2	—	1	1	34	15	18	0	2	1
California.....	20	28	11	—	5	20	135	234	164	7	10	10
Total.....	230	258	169	489	600	600	2,239	1,055	1,478	57	123	123
31 weeks.....	9,462	7,823	7,084	190,686	69,498	80,678	636,019	99,680	533,746	4,331	6,004	6,004

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Aug. 3, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Aug. 3, 1946	Aug. 4, 1945		Aug. 3, 1946	Aug. 4, 1945		Aug. 3, 1946	Aug. 4, 1945		Aug. 3, 1946	Aug. 4, 1945	
NEW ENGLAND												
Maine.....	1	2	1	2	5	8	0	0	0	0	0	1
New Hampshire.....	12	1	0	2	1	1	0	0	0	0	0	0
Vermont.....	1	5	1	1	3	3	0	0	0	0	0	0
Massachusetts.....	11	15	5	42	40	53	0	0	0	11	1	4
Rhode Island.....	0	0	0	1	1	2	0	0	0	0	0	0
Connecticut.....	0	9	9	8	6	11	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York.....	43	83	18	55	101	80	0	0	0	4	8	8
New Jersey.....	14	52	7	17	32	24	0	0	0	4	6	3
Pennsylvania.....	9	31	15	39	44	47	0	0	0	7	11	10
EAST NORTH CENTRAL												
Ohio.....	44	12	12	53	57	55	0	0	0	3	3	8
Indiana.....	11	5	5	9	15	11	0	0	0	3	1	1
Illinois.....	117	26	22	20	53	41	0	0	0	3	1	7
Michigan <sup>2</sup> .....	46	5	7	27	48	42	0	0	0	9	2	4
Wisconsin.....	30	3	3	30	30	37	0	0	0	0	1	1
WEST NORTH CENTRAL												
Minnesota.....	257	1	3	22	13	13	0	0	0	1	0	0
Iowa.....	50	5	1	6	13	13	0	0	0	0	0	1
Missouri.....	77	4	4	11	18	14	0	0	0	8	4	2
North Dakota.....	31	0	0	1	10	1	0	0	0	1	0	0
South Dakota.....	23	0	0	1	8	5	0	0	0	0	0	0
Nebraska.....	37	0	3	8	5	6	0	0	0	0	1	0
Kansas.....	80	5	5	4	15	10	0	0	0	1	0	4
SOUTH ATLANTIC												
Delaware.....	2	2	0	1	1	1	0	0	0	0	1	0
Maryland <sup>2</sup> .....	2	6	6	8	18	14	0	0	0	2	1	2
District of Columbia.....	2	3	0	2	7	4	0	0	0	0	0	0
Virginia.....	12	15	4	14	13	6	0	0	0	14	7	7
West Virginia.....	5	0	1	10	11	11	0	0	0	5	3	5
North Carolina.....	6	5	2	8	20	17	0	0	0	2	4	7
South Carolina.....	1	8	4	2	6	3	0	0	0	1	3	3
Georgia.....	8	5	5	5	5	10	0	0	0	4	10	10
Florida.....	17	1	1	0	2	2	0	0	0	8	1	2
EAST SOUTH CENTRAL												
Kentucky.....	3	0	8	6	16	12	0	0	0	8	20	14
Tennessee.....	10	23	13	10	17	16	0	0	0	4	11	7
Alabama.....	14	4	4	14	14	11	0	0	0	2	0	5
Mississippi <sup>2</sup> .....	9	1	2	102	7	3	0	0	0	4	3	13
WEST SOUTH CENTRAL												
Arkansas.....	30	2	2	0	2	2	0	1	0	2	5	5
Louisiana.....	20	4	4	2	18	5	0	0	0	2	21	9
Oklahoma.....	28	14	1	3	4	4	3	0	0	2	7	8
Texas.....	43	38	5	18	19	18	0	0	0	31	29	28
MOUNTAIN												
Montana.....	7	0	0	1	1	3	0	0	0	3	0	0
Idaho.....	3	0	0	8	5	1	0	0	0	4	4	0
Wyoming.....	6	0	0	0	1	2	0	0	0	1	0	0
Colorado.....	63	5	2	10	13	10	0	0	0	0	1	1
New Mexico.....	9	1	2	1	5	1	0	0	0	2	3	3
Arizona.....	9	0	1	3	1	2	0	0	0	1	0	1
Utah <sup>2</sup> .....	2	12	1	5	3	3	0	0	0	0	0	0
Nevada.....	1	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	13	12	5	7	11	11	0	0	0	0	2	2
Oregon.....	5	1	1	10	14	7	0	1	0	1	8	3
California.....	60	18	9	61	89	66	0	0	0	7	3	5
Total.....	1,284	474	450	673	839	744	3	2	2	165	186	232
31 weeks.....	5,455	2,913	2,766	85,740	133,004	96,206	278	261	600	2,241	2,485	2,928

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (*Salmonella* infection) 8; New York 1; New Jersey 1; West Virginia 1; Georgia 2; Florida 1; Kentucky 1; Louisiana 2; Texas 4; Oregon 1; California 1.

Telegraphic morbidity reports from State health officers for the week ended Aug. 3, 1946, and comparison with corresponding week of 1945 and 5-year median

Division and State	Whooping cough			Week ended August 3, 1946							
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever en- demic	Un- du- lant fever
	Aug. 3, 1946	Aug. 4, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	18	75	19								1
New Hampshire.....	3		2								
Vermont.....	17	28	25								2
Massachusetts.....	171	141	141								2
Rhode Island.....	12	4	15								
Connecticut.....	27	13	45	3							5
MIDDLE ATLANTIC											
New York.....	159	356	249		2			3			8
New Jersey.....	186	237	149			1	1	2			1
Pennsylvania.....	121	233	229					1			1
EAST NORTH CENTRAL											
Ohio.....	118	280	260	1						1	1
Indiana.....	9	55	42								4
Illinois.....	188	118	164	5	1			6			9
Michigan.....	77	74	177								5
Wisconsin.....	225	87	225								18
WEST NORTH CENTRAL											
Minnesota.....	12	10	53						1		
Iowa.....	46	10	32	3			1				16
Missouri.....	13	23	23					2	2		1
North Dakota.....	1		11								
South Dakota.....		1	3					1			
Nebraska.....	5		7								
Kansas.....	26	24	57				1				3
SOUTH ATLANTIC											
Delaware.....	2	1	1					4			
Maryland.....	35	54	84			1		4	1		
District of Columbia.....	10	16	20					1			
Virginia.....	144	71	70	1		153		4	3		4
West Virginia.....	13	52	41					2			1
North Carolina.....	125	163	199		1			6	1	3	1
South Carolina.....	27	71	84		10					1	
Georgia.....	12	21	20		4		1	5		27	5
Florida.....	15	11	11							25	2
EAST SOUTH CENTRAL											
Kentucky.....	27	54	61					2			1
Tennessee.....	22	73	44			1		4	1	1	1
Alabama.....	278	18	22							7	6
Mississippi.....									2	5	2
WEST SOUTH CENTRAL											
Arkansas.....	4	27	10		2				9		
Louisiana.....		39	5		2					8	2
Oklahoma.....	8	16	7	1				3			7
Texas.....	194	161	178	28	302	19			1	23	16
MOUNTAIN											
Montana.....	4	2	29					1			1
Idaho.....	13	6	6		1						2
Wyoming.....	1	5	6						2		
Colorado.....	9	49	49		1						1
New Mexico.....	3	6	6			6					
Arizona.....	5	10	14			17					
Utah.....	8	33	33	1		2			1		
Nevada.....											
PACIFIC											
Washington.....	30	37	37								
Oregon.....	23	19	19								1
California.....	70	216	185	2	4		14			3	5
Total.....	2,519	3,000	3,413	45	330	200	19	51	24	104	135
Same week, 1945.....	3,000			47	648	751	14	47	13	173	103
Average, 1943-45.....	2,971			46	620	476	18	49	14	155	
31 weeks: 1946.....	60,231			1,738	10,699	4,141	338	353	595	1,880	3,012
1945.....	79,405			1,124	14,956	4,970	242	306	492	2,310	2,947
Average, 1943-45.....	87,919		116,280	1,181	12,311	4,479	323	323	474	1,923	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

## WEEKLY REPORTS FROM CITIES

City reports for week ended July 27, 1946

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Erysipellitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	10	0	3	0	0	0	0	5
New Hampshire:												
Concord	0	0		0		0	1	0	0	0	0	
Vermont:												
Barre	0	0		0		0	0	0	0	0	0	
Massachusetts:												
Boston	2	0		0	29	0	6	1	6	0	1	20
Fall River	0	0		0	7	0	0	0	2	0	0	3
Springfield	0	0		0	11	0	0	0	0	0	0	7
Worcester	0	0		0	18	0	6	0	2	0	0	24
Rhode Island:												
Providence	0	0	1	0	5	0	0	0	0	0	0	14
Connecticut:												
Bridgeport	0	0		0	1	0	3	0	0	0	0	
Hartford	0	0		0	3	0	0	0	0	0	0	2
New Haven	0	0	1	0	3	0	0	0	0	0	0	
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		0	2	1	0	0	1	0	0	
New York	5	0	1	2	75	4	39	15	15	0	1	45
Rochester	2	0		0	4	1	1	2	3	0	0	
Syracuse	0	0		0		0	1	3	4	0	0	1
New Jersey:												
Camden	0	0		0		0	1	0	0	0	1	1
Newark	0	0		0	5	0	3	0	3	0	0	41
Trenton	0	0		0	3	0	0	0	0	0	0	3
Pennsylvania:												
Philadelphia	1	0	2	0	12	1	7	0	7	0	3	19
Pittsburgh	0	0		0	16	1	3	0	0	0	0	6
Reading	0	0		0		0	1	0	0	0	0	
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0		0	2	0	0	2	1	0	2	6
Cleveland	0	0	1	0	89	0	3	19	7	0	0	13
Columbus	0	0		0	2	0	2	0	4	0	0	6
Indiana:												
Fort Wayne	0	0		0		0	2	0	0	0	0	
Indianapolis	0	0		0	1	0	3	5	0	0	0	6
South Bend	0	0		0		0	0	0	0	0	0	
Terre Haute	0	0		0		0	1	0	0	0	0	
Illinois:												
Chicago	0	1		0	19	1	17	26	4	0	0	96
Springfield												
Michigan:												
Detroit	6	1	1	0	5	1	4	23	9	0	9	83
Flint	0	0		0	1	0	1	0	1	0	0	
Grand Rapids	0	0		0	3	0	2	1	1	0	0	26
Wisconsin:												
Kenosha	0	0		0	8	0	0	2	0	0	0	
Milwaukee	0	0		0	14	1	1	1	4	0	0	99
Racine	0	0		0	26	0	0	0	3	0	0	1
Superior	0	0		0	2	0	0	0	1	0	0	20
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0		0	1	0	1	3	0	0	0	1
Minneapolis	1	0		0	10	0	5	84	1	0	0	
St. Paul	0	0		0	8	0	1	32	2	0	0	10
Missouri:												
Kansas City	0	0		0		1	6	17	1	0	0	12
St. Joseph	0	0		0		0	0	0	0	0	0	3
St. Louis	1	1		0	3	0	9	13	1	0	0	6

## City reports for week ended July 27, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....												
Nebraska:												
Omaha.....	0	0		0		0	4	10	2	0	0	3
Kansas:												
Topeka.....	0	0		0		0	2	6	0	0	0	6
Wichita.....	0	0		0	1	0	4	6	1	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	1	0		0	1	0	0	1	1	0	1	3
Maryland:												
Baltimore.....	2	0		0	52	0	5	1	1	0	1	11
Cumberland.....	0	0		0	2	0	0	0	0	0	0	
Frederick.....	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington.....	0	0		0	20	0	5	0	4	0	0	9
Virginia:												
Lynchburg.....												
Richmond.....	0	0		1	2	0	0	1	2	0	1	21
Roanoke.....	0	0		0		0	0	0	0	0	0	
West Virginia:												
Charleston.....	0			0	1	0	0	0	1	0	0	
Wheeling.....	0	0		0		0	0	0	1	0	0	9
North Carolina:												
Raleigh.....	0	0		0	3	0	2	0	0	0	0	5
Wilmington.....	1	0		0	3	0	1	0	1	0	0	
Winston-Salem.....	0	0		0	2	0	0	0	0	0	0	16
South Carolina:												
Charleston.....	0	0	3	0	1	0	2	0	0	0	0	
Georgia:												
Atlanta.....	0	0		0	1	0	4	2	1	0	0	
Brunswick.....	0	0		0		0	0	0	0	0	0	
Savannah.....	0	0		0	2	0	0	0	0	0	0	
Florida:												
Tampa.....	2	0		0		0	0	1	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	2	0		1	1	0	4	4	1	0	0	2
Nashville.....	0	0		0		0	2	0	0	0	0	
Alabama:												
Birmingham.....	0	0		0		0	2	5	0	0	1	
Mobile.....	1	0	1	0		0	1	2	0	0	0	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0		0	1	0	0	5	0	0	0	
Louisiana:												
New Orleans.....	0	0		0	1	0	5	22	1	0	0	
Shreveport.....	0	0		0		0	3	2	0	0	0	
Texas:												
Dallas.....	1	0		0		0	0	1	1	0	0	6
Galveston.....	0	0		0		0	1	0	0	0	0	
Houston.....	1	0		0		0	9	1	1	0	0	1
San Antonio.....	0	0		0		0	0	0	0	0	1	
MOUNTAIN												
Montana:												
Billings.....	0	0		0	15	0	0	0	0	0	0	
Great Falls.....	0	0		0	6	0	0	0	1	0	0	
Helena.....	0	0		0		0	0	0	0	0	0	
Missoula.....	0	0		0	3	0	1	0	0	0	0	
Idaho:												
Boise.....	0	0		0		0	1	0	0	0	0	
Colorado:												
Denver.....	1	0		0	12	0	2	19	12	0	1	
Pueblo.....	0	0		0	7	0	0	2	0	0	0	
Utah:												
Salt Lake City.....	0	0		0	2	0	0	0	2	1	0	



## City reports for week ended July 27, 1946—Continued

	Diphtheria cases	Etiophthalmia, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	2	0	5	4	0	0	1	15
Spokane.....	0	0	-----	0	-----	0	1	1	0	0	0	1
Tacoma.....	0	0	-----	0	2	0	0	1	0	0	0	3
California:												
Los Angeles.....	4	0	2	1	39	2	5	16	10	0	0	11
Sacramento.....	0	1	-----	0	-----	1	2	2	2	0	0	-----
San Francisco.....	1	0	-----	0	7	0	2	0	7	0	1	-----
Total.....	36	4	13	5	587	15	203	367	139	1	25	708
Corresponding week, 1945.....	55	-----	10	3	506	-----	239	-----	220	0	19	1,026
Average, 1941-45.....	41	-----	22	16	600	-----	230	-----	223	0	27	1,099

1 3-year average, 1943-45.

2 5-year median, 1941-45.

Dysentery, amebic.—Cases: New York 7; Indianapolis 1; Chicago 3; Richmond 1.

Dysentery, bacillary.—Cases: New York 3; Chicago 1; Winston-Salem 1; Charleston, S. C., 4; Nashville 1; Los Angeles 5.

Dysentery, unspecified.—Cases: Boston 1; San Antonio 10.

Rocky Mountain spotted fever.—Cases: New York 4; Richmond 1; Nashville 1.

Typhoid fever.—Cases: Memphis 1.

Typhus fever, endemic.—Cases: Atlanta 1; Tampa 3; Mobile 2; New Orleans 3; Shreveport 1; Houston 1; San Antonio 3; Los Angeles 1.

## Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 34,254,300)

	Diphtheria case rates	Etiophthalmia, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	5.2	0.0	5.2	0.0	227	0.0	49.7	2.6	31	0.0	2.6	196
Middle Atlantic.....	3.7	0.0	1.4	0.9	54	3.7	25.9	10.6	15	0.0	2.3	54
East North Central.....	3.7	1.2	1.2	0.0	105	1.8	22.1	48.4	21	0.0	6.7	218
West North Central.....	6.0	2.0	0.0	0.0	46	2.0	64.4	343.9	16	0.0	0.0	86
South Atlantic.....	9.9	0.0	5.0	1.7	149	0.0	31.4	9.9	22	0.0	5.0	124
East South Central.....	17.7	0.0	5.9	5.9	6	0.0	53.1	64.9	6	0.0	5.9	13
West South Central.....	5.7	0.0	0.0	0.0	6	0.0	51.7	89.0	9	0.0	2.9	20
Mountain.....	7.9	0.0	0.0	0.0	357	0.0	31.8	166.8	119	7.9	7.9	32
Pacific.....	7.9	1.6	3.2	1.6	79	4.7	23.7	33.0	30	0.0	3.2	47
Total.....	5.5	0.6	2.0	0.8	90	2.3	31.7	56.0	21	0.2	3.8	108

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended July 6, 1946.*—During the week ended July 6, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		35		66	246	38	35	21	51	492
Diphtheria.....			2	17	7	3	1	1		31
Dysentery:										
Amebic.....				1	1					1
Bacillary.....				3						1
German measles.....				11	1			3	5	23
Influenza.....		1		2	2					5
Measles.....		32	2	184	309	93	21	237	23	901
Meningitis, meningococcus.....				1	1	1	1			4
Mumps.....				12	86	28	56	12	36	230
Pollomyelitis.....				4	1					5
Scarlet fever.....		13	2	41	33	13	2	9	10	123
Tuberculosis (all forms).....		6	19	50	53	19	16	2	27	192
Typhoid and paratyphoid fever.....				15	2		2		3	22
Undulant fever.....		4		4	4	1			1	14
Veneral diseases:										
Gonorrhea.....		16	9	139	106	42	40	33	81	466
Syphilis.....		16	9	78	60	10	18	13	42	246
Other forms.....				2						2
Whooping cough.....		9		20	53	2	1	3	1	89

### NORWAY

*Notifiable diseases—February 1946.*—During the month of February 1946,<sup>1</sup> cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	19	Mumps.....	163
Diphtheria.....	201	Pneumonia (all forms).....	3,385
Dysentery, unspecified.....	6	Pollomyelitis.....	26
Epidemic encephalitis.....	2	Rheumatic fever.....	220
Erysipelas.....	390	Scabies.....	5,087
Gastroenteritis.....	3,672	Scarlet fever.....	535
Gonorrhea.....	832	Syphilis.....	112
Hepatitis, epidemic.....	676	Tuberculosis (all forms).....	409
Impetigo contagiosa.....	2,978	Typhoid fever.....	4
Influenza.....	10,773	Undulant fever.....	3
Lymphogranuloma inguinale.....	1	Well's disease.....	5
Measles.....	1,967	Whooping cough.....	3,256

<sup>1</sup> For report for the month of March 1946, see PUBLIC HEALTH REPORTS of Aug. 2, 1946, p. 1170.

**REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND  
YELLOW FEVER RECEIVED DURING THE CURRENT WEEK**

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

**Cholera**

*Burma.*—For the week ended July 13, 1946, 264 cases of cholera were reported in Burma.

*China.*—Cholera has been reported in China as follows: Shanghai, July 11–20, 1946, 813 cases, 64 deaths; Kiangsu Province, June 21–30, 1946, 245 cases, 60 deaths; Kwangtung Province, June 21–30, 1946, 276 cases, 85 deaths, including 271 cases with 85 deaths reported in Canton.

**Plague**

*China—Fukien Province.*—Plague has been reported in Fukien Province, China, as follows: For the periods June 1–10, 1946, 247 cases, 104 deaths, including 131 cases with 48 deaths reported in Amoy; June 11–20, 1946, 130 cases, 59 deaths, including 29 cases with 17 deaths in Amoy; June 21–30, 1946, 48 cases, 28 deaths, including 41 cases with 24 deaths in Amoy.

**Typhus Fever**

*Morocco (French).*—For the period July 11–20, 1946, 55 cases of typhus fever were reported in French Morocco, by regions as follows: Agadir and frontier districts, 17; Casablanca, 22; Fez, 6; Marrakech, 2; Meknes, 5; Rabat, 3.

# FEDERAL SECURITY AGENCY

## United States Public Health Service

THOMAS PARRAN, *Surgeon General*

### DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 61

AUGUST 30, 1946

NUMBER 35

## IN THIS ISSUE

World Health Organization

Charter for World Health

Constitution of the World Health Organization

Arrangement Establishing Interim Commission



The Public Health Service is devoting this issue of PUBLIC HEALTH REPORTS to the recent international health conference and to the World Health Organization now being created. This movement should be of lasting significance and importance in public health history.

The United States has played a leading role in laying the ground work for the World Health Organization. Our responsibility for continued support and participation is great. Public health workers and all other friends of public health will wish to understand fully the aims, objectives, and functions of the new World Health Organization.

We in the United States must carry on two major jobs at once—we must maintain a place of leadership in world health affairs and at the same time redouble our efforts to attain a more comprehensive health program at home. We are faced with great opportunities for service to humanity.

A handwritten signature in dark ink, appearing to read "Thomas Parran". The signature is fluid and cursive, with a long horizontal stroke at the end.

*Surgeon General.*

AUGUST 30, 1946.

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# Public Health Reports

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## THE WORLD HEALTH ORGANIZATION <sup>1</sup>

July 22, 1946, will be an historic day for public health and medicine. On that day, representatives of 61 nations signed the constitution of the World Health Organization, the first fully empowered international agency in public health.

The International Health Conference which established the World Health Organization was the first conference to be called by the United Nations. It is appropriate that this honor went to the field of public health and medicine, and emphasized its role in the development of international peace and friendship. The World Health Organization is the first specialized agency of the United Nations to which every member of the United Nations has subscribed. More than that, nations not members of the United Nations were invited to the deliberations and were asked to join the organization, and 10 such nations also signed the charter.

The nature and the purposes of the World Health Organization are well implied in its name. Deliberately discarded were more restrictive names such as the International Health Organization or the Health Organization of the United Nations. For the first time, emphasis was laid not upon quarantine and checking epidemics, and other defensive measures, but upon positive, aggressive action toward health in its broadest sense. The preamble begins upon this note, declaring that "Health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity." And this standard of health is defined as one of the fundamental rights of every human being.

### *Preliminary Steps*

The history of the World Health Organization begins at the United Nations Conference on International Organization which met in San Francisco on April 25, 1945. At the instigation of Brazil, the word "health" was introduced in applicable sections of chapters IX and X

<sup>1</sup> From the Office of International Health Relations, U. S. Public Health Service.



of the Charter of the United Nations, dealing with international economic and social cooperation. The Conference also recognized the importance of health problems and their solution by approving unanimously a joint declaration proposed by Brazil and China for the purpose of establishing an international health organization.

Plans for bringing into being an international health organization were started shortly thereafter in several nations. In the United States, the Surgeon General of the Public Health Service established the Office of International Health Relations, and the Health Branch of the Division of International Labor, Social and Health Affairs of the Department of State was staffed with Public Health Service officers to work on this problem. In October 1945, the plans developed by these groups were examined by an advisory health group of 30 leaders in public health and civic activities, called together by the Department of State under the chairmanship of Dr. Thomas Parran. The interest of the United States in this field was impressively emphasized by the Senate, which in December 1945, passed a joint resolution requesting the President to take immediate steps toward the early convening of a health conference and the formation of an international health organization.

Suggestions were made for calling the international health conference under the sponsorship of several nations, but it was decided that this action should come through the United Nations. As a result, on February 15, 1946, the Economic and Social Council of the United Nations adopted a resolution calling for a Technical Preparatory Committee on Health to meet in Paris, and an International Health Conference to be convened in New York in June 1946.

The Technical Preparatory Committee on Health met in Paris on March 18, 1946. The Committee was composed of 16 experts<sup>2</sup> named by the Economic and Social Council, accompanied by alternates and advisors. The Committee elected Doctor René Sand of Belgium as its chairman. During a 3-week session, annotated agenda and proposals for an International Health Conference were prepared. Four basic documents, submitted by France, the United Kingdom, the United States, and Yugoslavia, were considered as a basis for the development of a constitution for a single new international health organization. The documents submitted by France and Yugoslavia served in the development of the preamble, and the United States document was used as the basis for the remainder of the proposed constitution.

The proposals as agreed upon by the Technical Preparatory Committee were circulated among all members of the United Nations.

<sup>2</sup> Bermann (Argentina), Sand (Belgium), de Paula Souza (Brazil), Ohlsholm (Canada), King and Sze (China), Canefik (Czechoslovakia), Shousha (Egypt), Cavallion and Ledatnche (France), Mani and Katal (India), Martinez-Baez (Mexico), Evang (Norway), Kacprzak (Poland), Jameson and Mackenzie (U. K.), Parran and Doull (U. S. A.), Stampar (Yugoslavia). U. S. S. R. was invited but did not attend.

A conviction was expressed that membership in the proposed World Health Organization should be open to all nations, and a resolution recommending participation as observers of nations not members of the United Nations at the International Health Conference was adopted. Dr. Parran, in his official report, concludes that the meeting was marked by a desire for the speedy development of a World Health Organization of broad scope and high purpose as a specialized agency to be brought into relationship with the United Nations.

### *International Health Conference*

The International Health Conference called by the Economic and Social Council of the United Nations met in New York City on June 19, 1946, and continued its sessions until July 22, 1946. Delegations from all of the 51 United Nations<sup>3</sup> took part in the deliberations; representatives from 13 nonmember nations<sup>4</sup>—3 allied control authorities<sup>5</sup> and 10 international organizations<sup>6</sup>—attended the meetings as observers. Dr. Parran, Surgeon General of the United States Public Health Service and chief delegate of the United States, was elected unanimously as president of the Conference. Vice presidents of the Conference were Sir William Jameson, United Kingdom; Dr. Fedor G. Krotkov, Union of Soviet Socialist Republics; Dr. James Kofoi Shen, China; Dr. Geraldo H. de Paula Souza, Brazil; and Dr. Andre Cavaillon, France.

In addition to Dr. Parran, the United States delegation consisted of Dr. Martha M. Eliot, Associate Director of the Children's Bureau, Federal Security Agency (vice chairman); Dr. Frank G. Boudreau, Director of the Milbank Memorial Fund; Edwin B. Fred, President of the University of Wisconsin and member of the National Advisory Health Council; Dr. James E. Paullin, past President of the American Medical Association; and Durward V. Sandifer, Chief of the Division of International Organization Affairs, Department of State.

The preparatory work done before the Conference greatly facilitated the progress of the meeting. There were, in effect, only two major unresolved problems upon which no previous agreement had been reached. One of these problems was whether the Soviet Union would

<sup>3</sup> Argentina, Australia, Belgium, Bolivia, Brazil, Byelorussia, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, France, Greece, Guatemala, Haiti, Honduras, India, Iran, Iraq, Lebanon, Liberia, Luxemburg, Mexico, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Philippine Republic, Poland, Saudi Arabia, Syria, Turkey, Ukraine, Union of Soviet Socialist Republics, Union of South Africa, United Kingdom, United States, Uruguay, Venezuela, Yugoslavia.

<sup>4</sup> Albania, Austria, Bulgaria, Eire, Finland, Hungary, Iceland, Italy, Portugal, Siam, Sweden, Switzerland, Transjordan. Afghanistan, Rumania, and Yemen were also invited to send observers, but were not represented.

<sup>5</sup> Germany, Japan, Korea.

<sup>6</sup> Food and Agriculture Organization, International Labor Organization, League of Red Cross Societies, Office of International d'Hygiène Publique, Pan American Sanitary Bureau, Provisional International Civil Aviation Organization, Rockefeller Foundation, United Nations Educational, Scientific and Cultural Organization, United Nations Relief and Rehabilitation Administration, World Federation of Trade Unions.

participate in the discussions and join the organization. This subject was resolved by the arrival of delegates from the Soviet Union, ably led by the Deputy Minister of Health of the U. S. S. R., Dr. Krotkov. The second problem confronting the Conference concerned regionalization and the role of existing international organizations dealing in the field of public health. It had been decided in Paris that the Office of International d'Hygiène Publique should be absorbed by the World Health Organization, and the same action was agreed upon regarding the fate of the Health Section of the League of Nations and of the epidemiologic intelligence of the health section of the United Nations Relief and Rehabilitation Administration. The Conference decided that the Pan American Sanitary Bureau should be integrated with the Organization through "common action based on mutual consent."

It is worthy of note that although prolonged debate took place on several issues, particularly on regionalization and the admittance to membership of nations not members of the United Nations, and although close votes were recorded on some points of detail, the decisions reached on all matters were approved unanimously by the Conference. As a result, representatives of all of the United Nations signed the charter at the end of the meeting, China and the United Kingdom without reservation and the remainder of the nations *ad referendum*. Ten nations not members of the United Nations also affixed their signatures to the constitution.<sup>7</sup> Nations which did not attend the Conference will be admitted as members when their applications have been approved by a simple majority vote of the Health Assembly.

#### *Interim Commission*

The World Health Organization will come into being when 26 members of the United Nations ratify the signatures of their delegates. For the period between the Conference and the first meeting of the Organization, the Conference set up an Interim Commission to conduct the essential business of the Organization, and to work out details of agreements between the World Health Organization and other international agencies. The Interim Commission consists of 18 nations.<sup>8</sup> Its temporary chairman was Dr. Krotkov, and its present chairman is Dr. Andrija Stampar of Yugoslavia. The Conference selected Dr. G. B. Chisholm of Canada as the Executive Secretary of the Interim Commission. Officers of the permanent organization will be selected at the first meeting of the World Health Organization, which will probably convene within the forthcoming year.

<sup>7</sup> Albania, Austria, Bulgaria, Eire, Finland, Italy, Portugal, Siam, Switzerland, and Transjordan.

<sup>8</sup> Australia, Brazil, Canada, China, Egypt, France, India, Liberia, Mexico, Netherlands, Norway, Peru, Ukraine, United Kingdom, United States, Union of Soviet Socialist Republics, Venezuela, Yugoslavia.

### *World Health Organization*

The organizational framework of the World Health Organization thus has been laid. With ratification by 26 nations, the Organization will come into being, and will be ready to start its functions.

What, then, will be the functions of this new health organization of the world? In other words, what can the world expect this organization to achieve?

Examination of the constitution will show that the International Health Conference created a document that is idealistic, yet practical, broad in scope, yet sufficiently specific, and has formed an organizational pattern that will enable it to go far toward the fulfillment of its functions and purposes.

The functions of the World Health Organization are set forth in detail in article 2 of its constitution, which is published elsewhere in this issue.

The work of the Organization shall be carried out by the World Health Assembly, composed of delegates representing the member nations and chosen from among persons most qualified by their technical competence in the field of health. The Health Assembly shall meet annually. Each nation shall have one vote. Territories which are not responsible for the conduct of their international relations may be admitted as associate members, and representatives from such areas should be chosen from technically qualified members of the native population.

An Executive Board, consisting of 18 persons designated by as many member nations and holding office for 3 years, shall act as the executive organ of the Health Assembly and give effect to the decisions and policies of the Health Assembly. The Secretariat shall comprise the Director-General and such technical and administrative staff as the Organization may require. This includes the establishment of committees in various technical and other fields, as determined by the Board. The Director-General shall have direct access to national health organizations, governmental or nongovernmental.

The Health Assembly shall define the geographical areas in which it is desirable to establish regional organizations to meet the special needs of such areas. Each regional organization shall be an integral part of the Organization. The Organization shall be brought into relation with the United Nations as one of the specialized agencies referred to in article 57 of the Charter of the United Nations.

The first tasks of the World Health Organization undoubtedly will concern themselves with the age-old scourges of man, accentuated by the devastation of the war. The need is urgent for caring for the sick and wounded, for feeding the hungry, controlling epidemic diseases, and providing basic environmental sanitation. By pooling the resources and the knowledge and skills of all nations, the day of elimi-

nation of such diseases as malaria, tuberculosis, and syphilis can be achieved.

Beyond the immediate needs, the World Health Organization looks forward toward leading the struggle in each country, with the help and encouragement of all other countries, for long-term programs of health services to protect the people from the ravages of disease and to insure to every individual a standard of health compatible with the technical achievements of the medical sciences. And, using the broad definition of health, the goal of application of technical achievements to all men is not limited to physical well-being. Mental hygiene, in helping man to adjust to his environment, must be used in combination with education in preventing the insanity of another total war, and destroying the basic causes of war.

The speed with which this meeting was called, following the signing of the Charter of the United Nations in San Francisco a year ago, testifies to the thoroughness of preliminary foundations. It testifies also to the practical value of previous international experiences in health agreements, even as limited as they were. In 1851 the French government called an international conference to discuss uniform quarantine codes. Soon after the turn of the century there came into existence the Office International d'Hygiene Publique and the Pan American Sanitary Bureau, which at the outset were concerned primarily with administering treaties dealing with the exchange of epidemic intelligence and preventing, through quarantine, the spread of disease from one country to another. Later these two organizations expanded their programs into other important fields. The League of Nations established a Health Organization which has been highly successful. At one time or another, important studies were sponsored in malaria, nutrition, rural hygiene, syphilis, and leprosy. International exchange of students and health experts was fostered. And, as you all know, significant progress was made in the standardization of drugs and biologicals.

The health problems to be encountered—in fact those already being encountered—cut widely across the relations between nations. Many other international agencies touch the field of health. For example, the Food and Agriculture Organization is concerned, on a world-wide basis, with nutrition; the International Labor Office with industrial hygiene and social insurance; the civil aviation agency with the spread of disease through rapid transport; the Trusteeship Council with the health of dependent peoples; the Narcotics Commission with habit-forming drugs. It is to be expected that the world health agency will work with these and other agencies in technical matters and join with them in reaching a common goal. It is contemplated, also, that the Economic and Social Council of the United Nations will act as the coordinator to prevent overlapping, and gaps, in those fields with which two or more specialized agencies are concerned.

There is thus a sound heritage of experience upon which the new international health organization will draw. The tasks ahead are great, but their accomplishment will bring great rewards.

## CHARTER FOR WORLD HEALTH<sup>1</sup>

By THOMAS PARRAN, *Surgeon General, United States Public Health Service, and President, International Health Conference*

This has been an historic international health conference. Its success equals that of any comparable international gathering. This has been due to the outstanding ability of you, the delegates, who are the leaders of the world in public health and medicine, and to the professional atmosphere and spirit of cooperation which has marked this month of arduous work.

The foundation of our work was laid by the Economic and Social Council last February in calling the conference, and by the constructive work of its Preparatory Committee of Experts in Paris. It has been greatly aided by the excellence of the Secretariat which the United Nations has provided. To the Council, the Preparatory Committee, and the Secretariat we express our deep appreciation.

The nations represented here today are signing a Magna Carta for health, which will bring into being a world health organization unique in its scope, authority, and functions. Its broad purpose is the attainment by all peoples of the highest possible level of health and well-being. We are convinced that health is not merely the absence of disease or infirmity but a state of complete physical, mental, and social well-being, the enjoyment of which we declare to be a fundamental right of every human being without distinction of race, religion, political belief, economic or social condition. We believe its attainment is essential for peace and security.

It is becoming clear that the health sciences can contribute to man's ability to live harmoniously in a changing total environment. Thus, improved health enhances standards of living, promotes economic prosperity, and contributes to our total objective, which is peace. The fundamental freedoms can be realized only when people are healthy and well nourished.

In the field of health, nations are interdependent. Epidemics anywhere in the world are dangerous to other nations. Low standards of health lay a burden upon prosperity and trade, imposing an economic handicap on every nation and on the world as a whole.

While the responsibility for health within its own borders is of

<sup>1</sup> Delivered at the signing of the Charter of The World Health Organization, Henry Hudson Hotel, New York City, July 22, 1946.

primary concern to each nation, the success of each can be greatly enhanced through international teamwork. The world health center we are creating, therefore, should be the directing and coordinating agency to provide information, leadership, and assistance in every phase of health work. Not only will the organization aid in disseminating and applying all of the scientific knowledge we now possess to prevent disease and promote health but it will encourage and conduct scientific research to forge more effective tools to control disease. Better remedies will be discovered. New preventives will be found. As a result, there will be brought under better control many of the human ills which now take such a large toll in disability and death. Cancer, heart disease, mental illness, and degenerative diseases, for example, are obvious targets for such international scientific endeavor.

Public health is a dynamic composite of many scientific disciplines. Through their application the average life span in the more advanced countries has been doubled during the past century. Yet, progress has been very uneven in the different nations. In some countries, for example, one-half of all children born do not reach 5 years of age. The average life span is about half of that attained in the more fortunate nations.

Recently we have seen the miracles which can be accomplished by the sulfa drugs and penicillin, yet only a small proportion of the world's population has access to those remedies. For a large part of the world's people doctors and hospitals, in the modern sense, are virtually unknown. Even such an elementary requirement for health as an uncontaminated water supply is lacking over large areas of the earth.

To achieve the great objectives of the World Health Organization will require our best, our most persistent, efforts. But our efforts alone are not enough. We must bring to the rank and file of mankind—to the common man everywhere—an understanding and appreciation of the elements of health, and a consuming desire to achieve it. Without this our signatures on a document here in New York will have little meaning. The World Health Organization, therefore, must be built for human service, must give practical help to the world's people, must undertake first things first.

During the past 40 years our nations have acquired some experience in international health action, first through efforts to prevent, through quarantine and through exchange of epidemic intelligence, pestilential disease from spreading between nations. During the years between the two world wars those efforts were broadened to include mutual help in disease control, in training of health personnel, in gathering valuable statistics, and in standardization of certain drugs and biologic products. During the war the United Nations pooled fully their military efforts to prevent disease. All of this experience will be useful to us in our tasks ahead.



A CHARTER FOR WORLD HEALTH COMES INTO BEING

The Presiding Officer's table at the International Health Conference as the Constitution of the World Health Organization was being signed, on July 22, 1946, in New York City. From left to right: Dr. G. B. Chisholm, Canada, Executive Secretary of the Interim Commission; Arkady Sobolev, Acting Secretary-General of the United Nations; Dr. Thomas Parran, United States, President of the Conference; Henri Laugier, Assistant Secretary-General for Social Affairs, United Nations; Dr. Yves Biraud, Secretary of the Conference; Dr. Feodor Krotkov, Union of Soviet Socialist Republics, and Dr. James Kofei Shen China, Vice-Chairmen of the Conference. (Official United Nations photo.)





The World Health Organization will be prepared to use all of our most modern scientific knowledge, our best tools, wherever needed to help heal the wounds of war and to eliminate the ancient human plagues, such as malaria and cholera, tuberculosis, and syphilis. Prevention of disease is a first objective. But this is only a first stop. Hunger and malnutrition stunt the bodies and warp the minds of a large part of the world's population. To attain freedom from want of food is another goal which we may hope to reach by pooling our nutritional knowledge with the food and agricultural efforts of the United Nations.

A next step toward world health is the positive improvement of health—of physical and mental fitness. Higher levels of physical development, a longer, more productive, more vigorous life span will be sought and attained.

To help reach these goals we need not only to apply all the knowledge we now have for prevention, treatment, and control of disease everywhere in the world, but we need to conduct intensive research in the laboratory, at the bedside, and in the field to push back the frontiers of the unknown in the health sciences.

The several, measurable, scientific objectives are difficult, but not impossible of attainment. Yet at our Conference the practical scientists have not been content to stop at this point. We have an additional task.

Humane plans for health go for naught unless the peoples of the world can learn to live together in peace. Never again can our world disintegrate into the insanity of another total war.

Public health experts realize that science may be used either to save life or to destroy civilization. Whether science is to be used for good or for evil is not determined by scientists themselves. The same type of research worker may discover penicillin or atomic fission. It is the mass conscience of mankind—the dominance of the moral or the amoral—which determines whether research is to be used for life or death.

In our Magna Carta for health we have ventured to declare that we have a contribution to make to the central world problem of our day, which is to help man learn to live harmoniously with his fellow man. In making this proposition I, for one, believe that health science must share the task with religion and education.

The science of mental hygiene is one of our newer disciplines, concerned with the human mind and emotions. Even in its present early stage of development, it helps man adjust to his environment, to live in greater harmony with his family, his community, his world. This science of mental hygiene needs urgently to be developed and applied as a basic element in preventing war and destroying the seeds of war.

The World Health Organization is, therefore, a collective instrument which will promote physical and mental vigor, prevent and control disease, expand scientific health knowledge, and contribute to the harmony of human relations. In short, it is a powerful instrument forged for peace.

We return to our homes knowing that we have done our best. We hope that history will record a job well done.

## CONSTITUTION OF THE WORLD HEALTH ORGANIZATION<sup>1</sup>

THE STATES parties to this Constitution declare, in conformity with the Charter of the United Nations, that the following principles are basic to the happiness, harmonious relations and security of all peoples:

Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

The health of all peoples is fundamental to the attainment of peace and security and is dependent upon the fullest cooperation of individuals and States.

The achievement of any State in the promotion and protection of health is of value to all.

Unequal development in different countries in the promotion of health and control of disease, especially communicable disease, is a common danger.

Healthy development of the child is of basic importance; the ability to live harmoniously in a changing total environment is essential to such development.

The extension to all peoples of the benefits of medical, psychological, and related knowledge is essential to the fullest attainment of health.

Informed opinion and active cooperation on the part of the public are of the utmost importance in the improvement of the health of the people.

Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures.

ACCEPTING THESE PRINCIPLES, and for the purpose of cooperation among themselves and with others to promote and protect the health of all peoples, the contracting parties agree to the present Constitution and hereby establish the World Health Organization as a specialized agency within the terms of Article 57 of the Charter of the United Nations.

### CHAPTER I—OBJECTIVE

**Article 1.**—The objective of the World Health Organization (hereinafter called the Organization) shall be the attainment by all peoples of the highest possible level of health.

### CHAPTER II—FUNCTIONS

**Article 2.**—In order to achieve its objective, the functions of the Organization shall be:

(a) to act as the directing and coordinating authority on international health work;

(b) to establish and maintain effective collaboration with the United Nations, specialized agencies, governmental health administrations, professional groups, and such other organizations as may be deemed appropriate;

(c) to assist governments, upon request, in strengthening health services;

(d) to furnish appropriate technical assistance and, in emergencies, necessary aid upon the request or acceptance of governments;

<sup>1</sup> Adopted July 22, 1946, by the International Health Conference convened by the Economic and Social Council of the United Nations, in New York City.

(e) to provide or assist in providing, upon the request of the United Nations, health services and facilities to special groups, such as the peoples of trust territories;

(f) to establish and maintain such administrative and technical services as may be required, including epidemiological and statistical services;

(g) to stimulate and advance work to eradicate epidemic, endemic, and other diseases;

(h) to promote, in cooperation with other specialized agencies where necessary, the prevention of accidental injuries;

(i) to promote, in cooperation with other specialized agencies where necessary, the improvement of nutrition, housing, sanitation, recreation, economic or working conditions, and other aspects of environmental hygiene;

(j) to promote cooperation among scientific and professional groups which contribute to the advancement of health;

(k) to propose conventions, agreements, and regulations, and make recommendations with respect to international health matters and to perform such duties as may be assigned thereby to the Organization and are consistent with its objective;

(l) to promote maternal and child health and welfare and to foster the ability to live harmoniously in a changing total environment;

(m) to foster activities in the field of mental health, especially those affecting the harmony of human relations;

(n) to promote and conduct research in the field of health;

(o) to promote improved standards of teaching and training in the health, medical and related professions;

(p) to study and report on, in cooperation with other specialized agencies where necessary, administrative and social techniques affecting public health and medical care from preventive and curative points of view, including hospital services and social security;

(q) to provide information, counsel and assistance in the field of health;

(r) to assist in developing an informed public opinion among all peoples on matters of health;

(s) to establish and revise as necessary international nomenclatures of diseases, of causes of death and of public health practices;

(t) to standardize diagnostic procedures as necessary;

(u) to develop, establish and promote international standards with respect to food, biological, pharmaceutical and similar products;

(v) generally to take all necessary action to attain the objective of the Organization.

### CHAPTER III—MEMBERSHIP AND ASSOCIATE MEMBERSHIP

**Article 3.**—Membership in the Organization shall be open to all States.

**Article 4.**—Members of the United Nations may become Members of the Organization by signing or otherwise accepting this Constitution in accordance with the provisions of Chapter XIX and in accordance with their constitutional processes.

**Article 5.**—The States whose governments have been invited to send observers to the International Health Conference held in New York, 1946, may become Members by signing or otherwise accepting this Constitution in accordance with the provisions of Chapter XIX and in accordance with their constitutional processes provided that such signature or acceptance shall be completed before the first session of the Health Assembly.

**Article 6.**—Subject to the conditions of any agreement between the United Nations and the Organization, approved pursuant to Chapter XVI, States which do not become Members in accordance with Articles 4 and 5 may apply to become Members and shall be admitted as Members when their application has been approved by a simple majority vote of the Health Assembly.

**Article 7.**—If a Member fails to meet its financial obligations to the Organization or in other exceptional circumstances the Health Assembly, may, on such conditions as it thinks proper, suspend the voting privileges and services to which

a Member is entitled. The Health Assembly shall have the authority to restore such voting privileges and services.

**Article 8.**—Territories or groups of territories which are not responsible for the conduct of their international relations may be admitted as Associate Members by the Health Assembly upon application made on behalf of such territory or group of territories by the Member or other authority having responsibility for their international relations. Representatives of Associate Members to the Health Assembly should be qualified by their technical competence in the field of health and should be chosen from the native population. The nature and extent of the rights and obligations of Associate Members shall be determined by the Health Assembly.

#### CHAPTER IV—ORGANS

**Article 9.**—The work of the Organization shall be carried out by:

- (a) The World Health Assembly (hereinafter called the Health Assembly);
- (b) The Executive Board (hereinafter called the Board);
- (c) The Secretariat.

#### CHAPTER V—THE WORLD HEALTH ASSEMBLY

**Article 10.**—The Health Assembly shall be composed of delegates representing Members.

**Article 11.**—Each Member shall be represented by not more than three delegates, one of whom shall be designated by the Member as chief delegate. These delegates should be chosen from among persons most qualified by their technical competence in the field of health, preferably representing the national health administration of the Member.

**Article 12.**—Alternates and advisers may accompany delegates.

**Article 13.**—The Health Assembly shall meet in regular annual session and in such special sessions as may be necessary. Special sessions shall be convened at the request of the Board or of a majority of the Members.

**Article 14.**—The Health Assembly, at each annual session, shall select the country or region in which the next annual session shall be held, the Board subsequently fixing the place. The Board shall determine the place where a special session shall be held.

**Article 15.**—The Board, after consultation with the Secretary-General of the United Nations, shall determine the date of each annual and special session.

**Article 16.**—The Health Assembly shall elect its President and other officers at the beginning of each annual session. They shall hold office until their successors are elected.

**Article 17.**—The Health Assembly shall adopt its own rules of procedure.

**Article 18.**—The functions of the Health Assembly shall be:

- (a) to determine the policies of the Organization;
- (b) to name the Members entitled to designate a person to serve on the Board;
- (c) to appoint the Director-General;
- (d) to review and approve reports and activities of the Board and of the Director-General and to instruct the Board in regard to matters upon which action, study, investigation or report may be considered desirable;
- (e) to establish such committees as may be considered necessary for the work of the Organization;
- (f) to supervise the financial policies of the Organization and to review and approve the budget;
- (g) to instruct the Board and the Director-General to bring to the attention of Members and of international organizations, governmental or nongovernmental, any matter with regard to health which the Health Assembly may consider appropriate;
- (h) to invite any organization, international or national, governmental or nongovernmental, which has responsibilities related to those of the Organization,

to appoint representatives to participate, without right of vote, in its meetings or in those of the committees and conferences convened under its authority, on conditions prescribed by the Health Assembly; but in the case of national organizations, invitations shall be issued only with the consent of the government concerned;

(2) to consider recommendations bearing on health made by the General Assembly, the Economic and Social Council, the Security Council or Trusteeship Council of the United Nations, and to report to them on the steps taken by the Organization to give effect to such recommendations;

(3) to report to the Economic and Social Council in accordance with any agreement between the Organization and the United Nations;

(k) to promote and conduct research in the field of health by the personnel of the Organization, by the establishment of its own institutions or by cooperation with official or nonofficial institutions of any Member with the consent of its government;

(l) to establish such other institutions as it may consider desirable;

(m) to take any other appropriate action to further the objective of the Organization.

**Article 19.**—The Health Assembly shall have authority to adopt conventions or agreements with respect to any matter within the competence of the Organization. A two-thirds vote of the Health Assembly shall be required for the adoption of such conventions or agreements which shall come into force for each Member when accepted by it in accordance with its constitutional processes.

**Article 20.**—Each Member undertakes that it will, within 18 months after the adoption by the Health Assembly of a convention or agreement, take action relative to the acceptance of such convention or agreement. Each Member shall notify the Director-General of the action taken and if it does not accept such convention or agreement within the time limit, it will furnish a statement of the reasons for nonacceptance. In case of acceptance, each Member agrees to make an annual report to the Director-General in accordance with Chapter XIV.

**Article 21.**—The Health Assembly shall have authority to adopt regulations concerning:

- (a) sanitary and quarantine requirements and other procedures designed to prevent the international spread of disease;
- (b) nomenclatures with respect to diseases, causes of death and public health practices;
- (c) standards with respect to diagnostic procedures for international use;
- (d) standards with respect to the safety, purity and potency of biological, pharmaceutical, and similar products moving in international commerce;
- (e) advertising and labeling of biological, pharmaceutical and similar products moving in international commerce.

**Article 22.**—Such Regulations adopted pursuant to Article 21 shall come into force for all Members after due notice has been given of their adoption by the Health Assembly except for such Members as may notify the Director-General of rejection or reservations within the period stated in the notice.

**Article 23.**—The Health Assembly shall have authority to make recommendations to Members with respect to any matter within the competence of the Organization.

## CHAPTER VI—THE EXECUTIVE BOARD

**Article 24.**—The Board shall consist of 18 persons designated by as many Members. The Health Assembly, taking into account an equitable geographical distribution, shall elect the Members entitled to designate a person to serve on the Board. Each of these Members should appoint to the Board a person technically qualified in the field of health, who may be accompanied by alternates and advisers.

**Article 25.**—These Members shall be elected for 3 years and may be re-elected; provided that of the Members elected at the first session of the Health Assembly,

the terms of six Members shall be for 1 year and the terms of six Members shall be for 2 years, as determined by lot.

**Article 26.**—The Board shall meet at least twice a year and shall determine the place of each meeting.

**Article 27.**—The Board shall elect its Chairman from among its Members and shall adopt its own rules of procedure.

**Article 28.**—The functions of the Board shall be:

- (a) to give effect to the decisions and policies of the Health Assembly;
- (b) to act as the executive organ of the Health Assembly;
- (c) to perform any other functions entrusted to it by the Health Assembly;
- (d) to advise the Health Assembly on questions referred to it by that body and on matters assigned to the Organization by conventions, agreements, and regulations;
- (e) to submit advice or proposals to the Health Assembly on its own initiative;
- (f) to prepare the agenda of meetings of the Health Assembly;
- (g) to submit to the Health Assembly for consideration and approval a general program of work covering a specific period;
- (h) to study all questions within its competence;
- (i) to take emergency measures within the functions and financial resources of the Organization to deal with events requiring immediate action. In particular it may authorize the Director-General to take the necessary steps to combat epidemics, to participate in the organization of health relief to victims of a calamity and to undertake studies and research the urgency of which has been drawn to the attention of the Board by any Member or by the Director-General.

**Article 29.**—The Board shall exercise on behalf of the whole Health Assembly the powers delegated to it by that body.

#### CHAPTER VII—THE SECRETARIAT

**Article 30.**—The Secretariat shall comprise the Director-General and such technical and administrative staff as the Organization may require.

**Article 31.**—The Director-General shall be appointed by the Health Assembly on the nomination of the Board on such terms as the Health Assembly may determine. The Director-General, subject to the authority of the Board, shall be the chief technical and administrative officer of the Organization.

**Article 32.**—The Director-General shall be ex-officio Secretary of the Health Assembly, of the Board, of all commissions and committees of the Organization and of conferences convened by it. He may delegate these functions.

**Article 33.**—The Director-General or his representative may establish a procedure by agreement with Members, permitting him, for the purpose of discharging his duties, to have direct access to their various departments, especially to their health administrations and to national health organizations, governmental or nongovernmental. He may also establish direct relations with international organizations whose activities come within the competence of the Organization. He shall keep Regional Offices informed on all matters involving their respective areas.

**Article 34.**—The Director-General shall prepare and submit annually to the Board the financial statements and budget estimates of the Organization.

**Article 35.**—The Director-General shall appoint the staff of the Secretariat in accordance with staff regulations established by the Health Assembly. The paramount consideration in the employment of the staff shall be to assure that the efficiency, integrity, and internationally representative character of the Secretariat shall be maintained at the highest level. Due regard shall be paid also to the importance of recruiting the staff on as wide a geographical basis as possible.

**Article 36.**—The conditions of service of the staff of the Organization shall conform as far as possible with those of other United Nations organizations.

**Article 37.**—In the performance of their duties the Director-General and the staff shall not seek or receive instructions from any government or from any authority external to the Organization. They shall refrain from any action which might reflect on their position as international officers. Each Member of the Organization on its part undertakes to respect the exclusively international character of the Director-General and the staff and not to seek to influence them.

#### CHAPTER VIII—COMMITTEES

**Article 38.**—The Board shall establish such committees as the Health Assembly may direct and, on its own initiative or on the proposal of the Director-General, may establish any other committees considered desirable to serve any purpose within the competence of the Organization.

**Article 39.**—The Board, from time to time and in any event annually, shall review the necessity for continuing each committee.

**Article 40.**—The Board may provide for the creation of or the participation by the Organization in joint or mixed committees with other organizations and for the representation of the Organization in committees established by such other organizations.

#### CHAPTER IX—CONFERENCES

**Article 41.**—The Health Assembly or the Board may convene local, general, technical or other special conferences to consider any matter within the competence of the Organization and may provide for the representation at such conferences of international organizations and, with the consent of the government concerned, of national organizations, governmental or nongovernmental. The manner of such representation shall be determined by the Health Assembly or the Board.

**Article 42.**—The Board may provide for representation of the Organization at conferences in which the Board considers that the Organization has an interest.

#### CHAPTER X—HEADQUARTERS

**Article 43.**—The location of the headquarters of the Organization shall be determined by the Health Assembly after consultation with the United Nations.

#### CHAPTER XI—REGIONAL ARRANGEMENTS

**Article 44.**—

(a) The Health Assembly shall from time to time define the geographical areas in which it is desirable to establish a regional organization.

(b) The Health Assembly may, with the consent of a majority of the Members situated within each area so defined, establish a regional organization to meet the special needs of such area. There shall not be more than one regional organization in each area.

**Article 45.**—Each regional organization shall be an integral part of the Organization in accordance with this Constitution.

**Article 46.**—Each regional organization shall consist of a Regional Committee and a Regional Office.

**Article 47.**—Regional Committees shall be composed of representatives of the Member States and Associate Members in the region concerned. Territories or groups of territories within the region, which are not responsible for the conduct of their international relations and which are not Associate Members, shall have the right to be represented and to participate in Regional Committees. The nature and extent of the rights and obligations of these territories or groups of territories in Regional Committees shall be determined by the Health Assembly in consultation with the Member or other authority having responsibility for the international relations of these territories and with the Member States in the region.



**Article 48.**—Regional Committees shall meet as often as necessary and shall determine the place of each meeting.

**Article 49.**—Regional Committees shall adopt their own rules of procedure.

**Article 50.**—The functions of the Regional Committee shall be:

- (a) to formulate policies governing matters of an exclusively regional character;
- (b) to supervise the activities of the Regional Office;
- (c) to suggest to the Regional office the calling of technical conferences and such additional work or investigation in health matters as in the opinion of the Regional Committee would promote the objective of the Organization within the region;
- (d) to co-operate with the respective regional committees of the United Nations and with those of other specialized agencies and with other regional international organizations having interests in common with the Organization;
- (e) to tender advice, through the Director-General, to the organization on international health matters which have wider than regional significance;
- (f) to recommend additional regional appropriations by the governments of the respective regions if the proportion of the central budget of the Organization allotted to that region is insufficient for the carrying out of the regional functions;
- (g) such other functions as may be delegated to the Regional Committee by the Health Assembly, the Board or the Director General.

**Article 51.**—Subject to the general authority of the Director-General of the Organization, the Regional Office shall be the administrative organ of the Regional Committee. It shall, in addition, carry out within the region the decisions of the Health Assembly and of the Board.

**Article 52.**—The head of the Regional Office shall be the Regional Director appointed by the Board in agreement with the Regional Committee.

**Article 53.**—The staff of the Regional Office shall be appointed in a manner to be determined by agreement between the Director-General and the Regional Director.

**Article 54.**—The Pan-American sanitary organization represented by the Pan-American Sanitary Bureau and the Pan-American Sanitary Conferences, and all other intergovernmental regional health organizations in existence prior to the date of signature of this Constitution, shall in due course be integrated with the Organization. This integration shall be effected as soon as practicable through common action based on mutual consent of the competent authorities expressed through the organizations concerned.

## CHAPTER XII—BUDGET AND EXPENSES

**Article 55.**—The Director-General shall prepare and submit to the Board the annual budget estimates of the Organization. The Board shall consider and submit to the Health Assembly such budget estimates, together with any recommendations the Board may deem advisable.

**Article 56.**—Subject to any agreement between the Organization and the United Nations, the Health Assembly shall review and approve the budget estimates and shall apportion the expenses among the Members in accordance with a scale to be fixed by the Health Assembly.

**Article 57.**—The Health Assembly or the Board acting on behalf of the Health Assembly may accept and administer gifts and bequests made to the Organization provided that the conditions attached to such gifts or bequests are acceptable to the Health Assembly or the Board and are consistent with the objective and policies of the Organization.

**Article 58.**—A special fund to be used at the discretion of the Board shall be established to meet emergencies and unforeseen contingencies.

### CHAPTER XIII—VOTING

**Article 59.**—Each Member shall have one vote in the Health Assembly.

**Article 60.**—(a) Decisions of the Health Assembly on important questions shall be made by a two-thirds majority of the Members present and voting. These questions shall include: the adoption of conventions or agreements; the approval of agreements bringing the Organization into relation with the United Nations and intergovernmental organizations and agencies in accordance with Articles 69, 70, and 72; amendments to this Constitution.

(b) Decisions on other questions, including the determination of additional categories of questions to be decided by a two-thirds majority, shall be made by a majority of the Members present and voting.

(c) Voting on analogous matters in the Board and in committees of the Organization shall be made in accordance with paragraphs (a) and (b) of this article.

### CHAPTER XIV—REPORTS SUBMITTED BY STATES

**Article 61.**—Each Member shall report annually to the Organization on the action taken and progress achieved in improving the health of its people.

**Article 62.**—Each Member shall report annually on the action taken with respect to recommendations made to it by the Organization and with respect to conventions, agreements, and regulations.

**Article 63.**—Each Member shall communicate promptly to the Organization important laws, regulations, official reports and statistics pertaining to health which have been published in the State concerned.

**Article 64.**—Each Member shall provide statistical and epidemiological reports in a manner to be determined by the Health Assembly.

**Article 65.**—Each Member shall transmit upon the request of the Board such additional information pertaining to health as may be practicable.

### CHAPTER XV—LEGAL CAPACITY, PRIVILEGES, AND IMMUNITIES

**Article 66.**—The Organization shall enjoy in the territory of each Member such legal capacity as may be necessary for the fulfilment of its objective and for the exercise of its functions.

**Article 67.**—(a) The Organization shall enjoy in the territory of each Member such privileges and immunities as may be necessary for the fulfilment of its objective and for the exercise of its functions.

(b) Representatives of Members, persons designated to serve on the Board, and technical and administrative personnel of the Organization shall similarly enjoy such privileges and immunities as are necessary for the independent exercise of their functions in connection with the Organization.

**Article 68.**—Such legal capacity, privileges, and immunities shall be defined in a separate agreement to be prepared by the Organization in consultation with the Secretary-General of the United Nations and concluded between the Members.

### CHAPTER XVI—RELATIONS WITH OTHER ORGANIZATIONS

**Article 69.**—The Organization shall be brought into relation with the United Nations as one of the specialized agencies referred to in Article 57 of the Charter of the United Nations. The agreement or agreements bringing the Organization into relation with the United Nations shall be subject to approval by a two-thirds vote of the Health Assembly.

**Article 70.**—The Organization shall establish effective relations and cooperate closely with such other intergovernmental organizations as may be desirable. Any formal agreement entered into with such organizations shall be subject to approval by a two-thirds vote of the Health Assembly.

**Article 71.**—The Organization may, on matters within its competence, make suitable arrangements for consultation and cooperation with nongovernmental international organizations and, with the consent of the government concerned, with national organizations, governmental or nongovernmental.

**Article 72.**—Subject to the approval by a two-thirds vote of the Health Assembly, the Organization may take over from any other international organization or agency whose purpose and activities lie within the field of competence of the Organization such functions, resources, and obligations as may be conferred upon the Organization by international agreement or by mutually acceptable arrangements entered into between the competent authorities of the respective organization.

## CHAPTER XVII—AMENDMENTS

**Article 73.**—Texts of proposed amendments to this Constitution shall be communicated by the Director-General to Members at least 6 months in advance of their consideration by the Health Assembly. Amendments shall come into force for all Members when adopted by a two-thirds vote of the Health Assembly and accepted by two-thirds of the Members in accordance with their respective constitutional processes.

## CHAPTER XVIII—INTERPRETATION

**Article 74.**—The Chinese, English, French, Russian, and Spanish texts of this Constitution shall be regarded as equally authentic.

**Article 75.**—Any question or dispute concerning the interpretation or application of this Constitution which is not settled by negotiation or by the Health Assembly shall be referred to the International Court of Justice in conformity with the Statute of the Court, unless the parties concerned agree on another mode of settlement.

**Article 76.**—Upon authorization by the General Assembly of the United Nations or upon authorization in accordance with any agreement between the Organization and the United Nations, the Organization may request the International Court of Justice for an advisory opinion on any legal question arising within the competence of the Organization.

**Article 77.**—The Director-General may appear before the Court on behalf of the Organization in connection with any proceedings arising out of any such request for an advisory opinion. He shall make arrangements for the presentation of the case before the Court including arrangements for the argument of different views on the question.

## CHAPTER XIX—ENTRY INTO FORCE

**Article 78.**—Subject to the provisions of Chapter III, this Constitution shall remain open to all States for signature or acceptance.

**Article 79.**—(a) States may become parties to this Constitution by

- (i) signature without reservation as to approval;
- (ii) signature subject to approval followed by acceptance; or
- (iii) acceptance.

(b) Acceptance shall be effected by the deposit of a formal instrument with the Secretary-General of the United Nations.

**Article 80.**—This Constitution shall come into force when 26 Members of the United Nations have become parties to it in accordance with the provisions of Article 79.

**Article 81.**—In accordance with Article 102 of the Charter of the United Nations, the Secretary-General of the United Nations will register this Constitution when

it has been signed without reservation as to approval on behalf of one State or upon deposit of the first instrument of acceptance.

**Article 82.**—The Secretary-General of the United Nations will inform States parties to this Constitution of the date when it has come into force. He will also inform them of the dates when other States have become parties to this Constitution.

IN FAITH WHEREOF the undersigned representatives having been duly authorized for that purpose, sign this Constitution.

DONE in the City of New York this twenty-second day of July 1946, in a single copy in the Chinese, English, French, Russian, and Spanish languages, each text being equally authentic. The original texts shall be deposited in the archives of the United Nations. The Secretary-General of the United Nations will send certified copies to each of the Governments represented at the Conference.

## **ARRANGEMENT CONCLUDED BY THE GOVERNMENTS REPRESENTED AT THE INTERNATIONAL HEALTH CON- FERENCE**

THE GOVERNMENTS represented at the International Health Conference convened on 19 June 1946 in the City of New York by the Economic and Social Council of the United Nations,

Having agreed that an international organization to be known as the World Health Organization shall be established,

Having this day agreed upon a Constitution for the World Health Organization, and

Having resolved that, pending the coming into force of the Constitution and the establishment of the World Health Organization, as provided in the Constitution, an Interim Commission should be established,

AGREE as follows:

1. There is hereby established an Interim Commission of the World Health Organization consisting of 18 persons to be designated by the following States: Australia, Brazil, Canada, China, Egypt, France, India, Liberia, Mexico, Netherlands, Norway, Peru, Ukrainian Soviet Socialist Republic, United Kingdom, United States of America, Union of Soviet Socialist Republics, Venezuela, and Yugoslavia. Each of these States should designate to the Interim Commission a person technically qualified in the field of health, who may be accompanied by alternates and advisers.

2. The functions of the Interim Commission shall be:

(a) To convoke the first session of the World Health Assembly as soon as practicable, but not later than 6 months after the date on which the Constitution of the Organization comes into force;

(b) To prepare and submit to the signatories to this Arrangement, at least 6 weeks before the first session of the Health Assembly, the provisional agenda for that session and necessary documents and recommendations relating thereto, including:

- (i) Proposals as to program and budget for the first year of the Organization,
- (ii) Studies regarding location of headquarters of the Organization,
- (iii) Studies regarding the definition of geographical areas with a view to the eventual establishment of regional organizations as contemplated in Chapter XI of the Constitution, due consideration being given to the views of the governments concerned, and
- (iv) Draft financial and staff regulations for approval by the Health Assembly.

In carrying out the provisions of this paragraph due consideration shall be given to the proceedings of the International Health Conference.

(c) To enter into negotiations with the United Nations with a view to the preparation of an agreement or agreements as contemplated in Article 57 of the Charter of the United Nations and in Article 69 of the Constitution. Such agreement or agreements shall

(i) Provide for effective cooperation between the two organizations in the pursuit of their common purposes;

(ii) Facilitate, in conformity with Article 58 of the Charter, the coordination of the policies and activities of the Organization with those of other specialized agencies; and

(iii) At the same time recognize the autonomy of the Organization within the field of its competence as defined in its Constitution.

(d) To take all necessary steps to effect the transfer from the United Nations to the Interim Commission of the functions, activities, and assets of the League of Nations Health Organization which have been assigned to the United Nations;

(e) To take all necessary steps in accordance with the provisions of the Protocol concerning the Office International d'Hygiene publique signed 22 July 1946 for the transfer to the Interim Commission of the duties and functions of the Office, and to initiate any action necessary to facilitate the transfer of the assets and liabilities of the Office to the World Health Organization upon the termination of the Rome Agreement of 1907;

(f) To take all necessary steps for assumption by the Interim Commission of the duties and functions entrusted to the United Nations Relief and Rehabilitation Administration by the International Sanitary Convention, 1944, modifying the International Sanitary Convention of 21 June 1926, the Protocol to Prolong the International Sanitary Convention, 1944, the International Sanitary Convention for Aerial Navigation, 1944, modifying the International Sanitary Convention for Aerial Navigation of 12 April 1933, and the Protocol to Prolong the International Sanitary Convention for Aerial Navigation, 1944;

(g) To enter into the necessary arrangements with the Pan-American sanitary organization and other existing inter-governmental regional health organizations with a view to giving effect to the provisions of Article 54 of the Constitution, which arrangements shall be subject to approval by the Health Assembly;

(h) To establish effective relations and enter into negotiations with a view to concluding agreements with other inter-governmental organizations as contemplated in Article 70 of the Constitution;

(i) To study the question of relations with non-governmental international organizations and with national organizations in accordance with Article 71 of the Constitution, and to make interim arrangements for consultation and co-operation with such organizations as the Interim Commission may consider desirable;

(j) To undertake initial preparations for revising, unifying and strengthening existing international sanitary conventions;

(k) To review existing machinery and undertake such preparatory work as may be necessary in connection with:

(i) The next decennial revision of "The International Lists of Causes of Death" (including the lists adopted under the International Agreement of 1934 relating to Statistics of Causes of Death); and

(ii) The establishment of International Lists of Causes of Morbidity;

(l) To establish effective liaison with the Economic and Social Council and such of its commissions as may appear desirable, in particular the Commission on Narcotic Drugs; and

(m) To consider any urgent health problem which may be brought to its notice by any government, to give technical advice in regard thereto, to bring urgent health needs to the attention of governments and organizations which may be in a position to assist, and to take such steps as may be desirable to coordinate any assistance such governments and organizations may undertake to provide.

3. The Interim Commission may establish such committees as it considers desirable.

4. The Interim Commission shall elect its Chairman and other officers, adopt its own rules of procedure and consult such persons as may be necessary to facilitate its work.

5. The Interim Commission shall appoint an Executive Secretary who shall:

(a) Be its chief technical and administrative officer;

(b) Be ex-officio secretary of the Interim Commission and of all committees established by it;

(c) Have direct access to national health administrations in such manner as may be acceptable to the government concerned; and

(d) Perform such other functions and duties as the Interim Commission may determine.

6. The Executive Secretary, subject to the general authority of the Interim Commission, shall appoint such technical and administrative staff as may be required. In making these appointments he shall have due regard for the principles embodied in Article 36 of the Constitution. He shall take into consideration the desirability of appointing available personnel from the staffs of the League of Nations Health Organization, the Office International d'Hygiene publique, and the Health Division of the United Nations Relief and Rehabilitation Administration. He may appoint officials and specialists made available by governments. Pending the recruitment and organization of his staff, he may utilize such technical and administrative assistance as the Secretary-General of the United Nations may make available.

7. The Interim Commission shall hold its first session in New York immediately after its appointment and shall meet thereafter as often as may be necessary but not less than once in every four months. At each session the Interim Commission shall determine the place of its next session.

8. The expenses of the Interim Commission shall be met from funds provided by the United Nations and for this purpose the Interim Commission shall make the necessary arrangements with the appropriate authorities of the United Nations. Should these funds be insufficient, the Interim Commission may accept advances from governments. Such advances may be set off against the contributions of the governments concerned to the Organization.

9. The Executive Secretary shall prepare and the Interim Commission shall review and approve budget estimates:

(a) For the period from the establishment of the Interim Commission until 31 December 1946, and

(b) For subsequent periods as necessary.

10. The Interim Commission shall submit a report of its activities to the Health Assembly at its first session.

11. The Interim Commission shall cease to exist upon resolution of the Health Assembly at its first session, at which time the property and records of the Interim Commission and such of its staff as may be required, shall be transferred to the Organization.

12. This Arrangement shall come into force for all signatories on this day's date.

IN FAITH WHEREOF the undersigned representatives, having been duly authorized for that purpose, sign this Arrangement in the Chinese, English, French, Russian, and Spanish languages, all texts being equally authentic.

SIGNED at the City of New York this 22nd day of July 1946.

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED AUGUST 10, 1946

#### Summary

A total of 1,579 cases of poliomyelitis was reported for the week, as compared with 1,284 last week, 1,016 for the same week in 1944, and a 5-year (1941-45) median of 545. Decreases were recorded in the New England, South Atlantic, and West South Central areas. The largest increase (555 to 701), as well as 44 percent of the week's total, was reported in the West North Central area. Decreases occurred in 14 of the 37 States reporting currently 5 or more cases. The 25 States reporting 17 or more cases are as follows (last week's figures in parentheses): *Increases*—New York 70 (43), New Jersey 18 (14), Indiana 21 (11), Illinois 131 (117), Michigan 74 (46), Wisconsin 31 (30), Minnesota 360 (257), Missouri 80 (77), South Dakota 70 (23), Nebraska 45 (37), Tennessee 17 (10), Alabama 44 (14), Mississippi 22 (9), Oklahoma 40 (28), Wyoming 18 (6), Washington 17 (13), California 115 (60); *decreases*—Ohio 25 (44), Iowa 48 (50), North Dakota 24 (31), Kansas 74 (80), Arkansas 17 (30), Louisiana 17 (20), Texas 34 (43), Colorado 53 (63). The total for the year to date is 7,034, as compared with 5,008 for the period in 1944 and a 5-year median of 3,311.

Of 138 cases of typhoid and paratyphoid fever reported during the current week, Texas reported 18 (last week 31), and Louisiana 11 (last week 2). The total to date is 2,379, as compared with 2,625 for the period last year, and a 5-year median of 3,090.

The incidence of diphtheria continues above the 5-year (1941-45) median expectancy. A total of 9,696 cases has been reported to date, as compared with 8,078 in 1945, 6,580 in 1944, and a 5-year median of 7,241 for the same period.

Of 23 cases of infectious encephalitis reported for the current week, 9 occurred in California, where 88 cases have been reported to date this year, most of which occurred in Fresno and Kern Counties.

Deaths recorded for the week in 93 large cities of the United States totaled 7,866, as compared with 7,986 last week, 7,919 and 8,223, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,064. The total to date is 297,437, as compared with 292,237 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended August 10, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Aug. 10, 1946	Aug. 11, 1945		Aug. 10, 1946	Aug. 11, 1945		Aug. 10, 1946	Aug. 11, 1945		Aug. 10, 1946	Aug. 11, 1945	
NEW ENGLAND												
Maine.....	4	5	1	—	—	—	16	3	12	0	0	0
New Hampshire.....	0	0	0	—	—	—	11	1	—	0	0	0
Vermont.....	0	2	0	—	—	—	7	1	14	0	0	0
Massachusetts.....	7	4	3	—	—	—	114	80	80	1	0	3
Rhode Island.....	0	0	0	—	25	—	7	—	2	0	1	0
Connecticut.....	0	1	1	1	—	—	26	12	12	1	3	3
MIDDLE ATLANTIC												
New York.....	17	8	7	( <sup>1</sup> )	( <sup>1</sup> )	11	282	26	129	8	8	9
New Jersey.....	3	1	1	1	1	2	74	19	42	5	0	6
Pennsylvania.....	17	10	7	1	1	—	88	106	47	3	6	6
EAST NORTH CENTRAL												
Ohio.....	6	4	3	—	1	2	122	12	32	3	7	6
Indiana.....	4	5	5	—	6	3	9	7	7	3	4	1
Illinois.....	10	0	6	2	—	2	34	85	40	1	6	6
Michigan <sup>1</sup> .....	6	7	2	—	1	1	62	62	62	2	5	3
Wisconsin.....	5	2	1	28	9	7	112	35	144	1	1	1
WEST NORTH CENTRAL												
Minnesota.....	1	4	3	—	—	—	12	3	9	2	1	1
Iowa.....	6	4	3	—	—	—	22	9	9	1	1	1
Missouri.....	4	0	1	3	3	1	—	7	16	4	0	0
North Dakota.....	2	5	0	2	—	—	—	—	5	0	0	0
South Dakota.....	1	6	2	—	—	—	4	1	2	0	0	0
Nebraska.....	1	3	1	4	—	2	9	5	10	2	0	0
Kansas.....	9	4	2	1	—	—	6	10	10	0	2	0
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	2	—	—	0	1	1
Maryland <sup>1</sup> .....	4	3	2	—	—	—	34	—	5	1	2	2
District of Columbia.....	0	1	0	—	—	—	4	1	6	2	3	1
Virginia.....	6	6	8	103	74	37	32	4	11	2	1	2
West Virginia.....	0	1	4	1	4	2	3	—	1	0	2	0
North Carolina.....	6	25	11	—	—	—	8	7	31	2	3	2
South Carolina.....	3	12	7	128	86	98	52	11	11	0	0	0
Georgia.....	11	11	9	4	6	16	13	1	5	0	2	2
Florida.....	8	6	2	2	2	2	6	4	4	1	0	0
EAST SOUTH CENTRAL												
Kentucky.....	7	3	3	1	—	—	9	3	4	0	2	2
Tennessee.....	3	3	3	5	4	5	11	1	9	1	4	2
Alabama.....	7	12	11	1	33	16	5	3	3	0	1	1
Mississippi <sup>1</sup> .....	11	12	5	—	—	—	—	—	—	3	4	3
WEST SOUTH CENTRAL												
Arkansas.....	3	3	4	2	2	12	7	4	4	1	5	0
Louisiana.....	2	7	3	—	56	4	9	3	4	0	0	0
Oklahoma.....	1	3	1	2	12	6	4	6	10	0	0	0
Texas.....	18	29	25	205	376	210	105	50	50	3	8	3
MOUNTAIN												
Montana.....	0	0	1	8	—	—	9	9	3	0	0	0
Idaho.....	1	2	0	8	4	—	12	25	3	0	0	0
Wyoming.....	2	0	2	1	—	—	12	2	5	0	0	1
Colorado.....	8	3	3	2	—	9	22	20	20	0	1	1
New Mexico.....	1	3	1	—	—	—	8	—	2	2	0	0
Arizona.....	5	3	2	10	12	18	13	1	8	1	0	0
Utah <sup>1</sup> .....	0	0	0	—	4	—	12	54	12	0	0	0
Nevada.....	0	0	0	—	—	—	—	—	5	2	0	0
PACIFIC												
Washington.....	1	1	1	—	—	—	20	40	26	0	2	1
Oregon.....	6	2	2	—	3	8	8	13	20	2	1	2
California.....	17	29	13	5	6	13	105	196	133	7	6	6
Total.....	234	255	176	531	731	483	1,642	942	1,139	67	93	63
32 weeks.....	9,696	8,078	7,241	191,217	70,229	81,161	637,661	100,602	535,598	4,398	6,067	4,967

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.



Telegraphic morbidity reports from State health officers for the week ended August 10, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio myelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Aug. 10, 1946	Aug. 11, 1945		Aug. 10, 1946	Aug. 11, 1945		Aug. 10, 1946	Aug. 11, 1945		Aug. 10, 1946	Aug. 11, 1945	
NEW ENGLAND												
Maine.....	2	12	0	22	10	2	0	0	0	0	1	0
New Hampshire.....	8	0	0	0	2	2	0	0	0	1	0	0
Vermont.....	0	2	2	2	2	2	0	0	0	0	0	0
Massachusetts.....	9	28	4	30	43	47	0	0	0	5	3	3
Rhode Island.....	3	0	0	2	2	1	0	0	0	0	0	0
Connecticut.....	1	11	10	6	7	6	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York.....	70	111	30	71	97	54	0	0	0	5	8	9
New Jersey.....	18	71	21	19	18	18	0	0	0	2	7	4
Pennsylvania.....	12	45	17	37	31	32	0	0	0	4	11	10
EAST NORTH CENTRAL												
Ohio.....	25	14	14	44	54	50	0	0	0	5	3	6
Indiana.....	21	12	12	10	13	10	0	0	1	3	2	5
Illinois.....	131	73	27	25	28	33	0	0	0	4	3	4
Michigan <sup>2</sup> .....	74	8	8	34	51	35	1	0	0	4	0	2
Wisconsin.....	31	6	2	18	37	37	0	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota.....	360	2	7	8	25	14	0	0	0	0	0	0
Iowa.....	48	6	5	7	8	9	0	0	0	0	0	0
Missouri.....	50	5	4	3	5	9	0	0	0	3	2	6
North Dakota.....	24	0	1	0	2	2	0	0	0	0	1	0
South Dakota.....	70	0	0	6	11	6	0	2	1	0	1	1
Nebraska.....	45	13	4	4	8	3	0	0	0	0	0	0
Kansas.....	74	3	3	3	23	15	1	0	0	2	1	2
SOUTH ATLANTIC												
Delaware.....	1	3	0	2	2	1	0	0	0	0	0	0
Maryland <sup>2</sup> .....	2	4	4	9	8	9	0	0	0	3	1	3
District of Columbia.....	0	13	2	3	3	3	0	0	0	0	0	0
Virginia.....	5	27	3	14	18	13	0	0	0	7	8	8
West Virginia.....	3	0	2	10	22	22	0	0	0	1	3	5
North Carolina.....	2	7	7	7	14	23	0	0	0	2	2	4
South Carolina.....	1	13	6	2	7	4	0	0	0	6	4	4
Georgia.....	49	8	5	4	15	7	0	0	0	2	16	15
Florida.....	9	3	2	1	3	2	0	0	0	0	5	6
EAST SOUTH CENTRAL												
Kentucky.....	8	0	6	11	17	13	0	0	0	6	11	17
Tennessee.....	17	24	12	8	13	12	0	0	0	3	3	8
Alabama.....	44	8	6	4	17	13	0	0	0	0	3	4
Mississippi <sup>2</sup> .....	22	3	3	2	7	4	0	0	0	5	4	4
WEST SOUTH CENTRAL												
Arkansas.....	17	2	3	4	7	3	0	0	0	4	0	7
Louisiana.....	17	2	2	1	3	2	0	0	0	11	3	7
Oklahoma.....	40	18	3	6	5	5	0	0	0	9	6	6
Texas.....	34	56	7	20	30	22	0	1	0	18	20	20
MOUNTAIN												
Montana.....	6	1	1	1	4	4	0	0	0	1	0	0
Idaho.....	0	0	0	1	2	1	0	1	0	5	1	0
Wyoming.....	18	0	0	1	0	0	0	0	0	1	0	0
Colorado.....	53	7	2	17	10	7	0	0	0	0	2	1
New Mexico.....	9	2	0	0	0	1	0	0	0	3	0	2
Arizona.....	5	0	2	2	2	2	0	0	0	1	0	1
Utah <sup>2</sup> .....	7	18	2	5	2	2	0	0	0	1	1	0
Nevada.....	2	1	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	17	17	3	4	15	11	0	0	0	0	1	0
Oregon.....	10	2	2	6	0	5	0	0	0	2	1	1
California.....	115	40	11	59	111	60	0	0	0	8	2	3
Total.....	1,579	701	545	555	814	660	2	4	5	138	140	197
32 weeks.....	7,034	3,614	3,311	86,296	133,818	96,866	275	285	607	2,379	2,625	3,090

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 2; New York 1; New Jersey 1; Ohio 2; Virginia 1; South Carolina 1; Georgia 1; Louisiana 2; Texas 2; California 2.

<sup>3</sup> Correction: Poliomyelitis, Georgia, week ended July 27, 15 instead of 16.

Telegraphic morbidity reports from State health officers for the week ended August 10, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended August 10, 1946							
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever
	Aug. 10, 1946	Aug. 11, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	24	26	20								
New Hampshire.....	7			1							
Vermont.....	9	21	39								1
Massachusetts.....	116	133	133							1	3
Rhode Island.....	22	11	13								
Connecticut.....	36	37	37	1							2
MIDDLE ATLANTIC											
New York.....	155	317	272	7	14		1				14
New Jersey.....	165	197	158					2			2
Pennsylvania.....	90	240	216								2
EAST NORTH CENTRAL											
Ohio.....	54	196	196				1		1		3
Indiana.....	20	34	34					2			4
Illinois.....	161	131	190	6	2		1	2	1		10
Michigan <sup>1</sup> .....	262	111	205	2							2
Wisconsin.....	227	55	220								7
WEST NORTH CENTRAL											
Minnesota.....	22	21	51	6							1
Iowa.....	38	9	20					1			6
Missouri.....	17	34	20			2	1	1	1		1
North Dakota.....	1	3	13				1				
South Dakota.....	4		4								1
Nebraska.....	6	1	9								
Kansas.....	40	20	42				1		1		3
SOUTH ATLANTIC											
Delaware.....	9		1								
Maryland <sup>1</sup> .....	31	69	74			1		5			
District of Columbia.....	3	15	15								
Virginia.....	74	53	53			112		8	2	4	2
West Virginia.....	25	20	29					1			
North Carolina.....	76	133	145					2		2	1
South Carolina.....	42	67	71		18						
Georgia.....	8	26	12		4	2	1	1		22	6
Florida.....	9	11	14							14	2
EAST SOUTH CENTRAL											
Kentucky.....	49	28	38		9				1		2
Tennessee.....	26	31	31	1	2		3	2	1		
Alabama.....	10	37	22							15	4
Mississippi <sup>1</sup> .....									3	5	4
WEST SOUTH CENTRAL											
Arkansas.....	15	26	14	2	10				5		3
Louisiana.....	8	35	13		2	2			1	10	5
Oklahoma.....	9	16	16	1	1			3			
Texas.....	148	179	179	9	269	58	2	1	1	31	19
MOUNTAIN											
Montana.....	4	3	17								
Idaho.....	14	4	3	1							
Wyoming.....	4	12	10								
Colorado.....	14	68	40								
New Mexico.....	4	2	4	1	1	2					
Arizona.....	1	5	13			17					
Utah <sup>1</sup> .....	1	36	36					1			
Nevada.....			3								
PACIFIC											
Washington.....	45	36	36				2				
Oregon.....	28	16	16	1				1			
California.....	55	219	155	3	11		9				5
Total.....	2,183	2,744	3,039	44	343	194	23	29	17	104	118
Same week, 1945.....	2,744			34	652	703	18	23	16	191	82
Average, 1943-45.....	2,858			46	601	468	17	24	13	164	
32 weeks, 1946.....	62,414			1,782	11,042	4,335	361	382	612	1,984	3,130
1945.....	82,149			1,158	15,608	5,673	250	829	508	2,501	3,029
Average, 1943-45.....	90,777		119,319	1,177	12,913	4,947	340	348	487	2,054	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

## WEEKLY REPORTS FROM CITIES

City reports for week ended August 3, 1946

This table lists the reports from 84 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Erysipellitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0		0		0	3	0	0	0	0	2
New Hampshire:												
Concord.....	0	0		0		0	2	0	0	0	0	
Massachusetts:												
Boston.....	3	0		0	21	0	6	5	11	0	1	22
Fall River.....	0	0		0	4	0	0	0	2	0	0	
Springfield.....	0	0		0	6	0	0	0	2	0	0	23
Worcester.....	0	0		0	10	0	3	2	0	0	0	18
Rhode Island:												
Providence.....	1	0		0	11	1	3	0	1	0	0	10
Connecticut:												
Bridgeport.....	0	0		0	3	0	0	0	0	0	0	3
Hartford.....	0	0		0	1	0	0	0	0	0	0	1
New Haven.....	0	0		0	9	0	0	0	1	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo.....	0	0		0		0	1	0	3	0	0	
New York.....	13	0	1	43	1	39	22	16	0	0	2	73
Rochester.....	0	1		1	2	0	1	2	4	0	0	
Syracuse.....	0	0		0	2	0	0	4	2	0	0	1
New Jersey:												
Camden.....	1	0		0		0	0	0	0	0	0	
Newark.....	0	0		0	3	1	2	0	2	0	0	26
Trenton.....	0	0		0	1	0	0	0	0	0	1	2
Pennsylvania:												
Philadelphia.....	3	0		0	11	1	15	3	8	0	2	22
Pittsburgh.....	4	0		0	8	0	2	0	1	0	0	17
Reading.....	0	0		0	2	0	1	0	0	0	0	8
EAST NORTH CENTRAL												
Ohio:												
Cleveland.....	2	0		0	73	0	1	26	9	0	0	17
Columbus.....	0	0		0		0	2	0	1	0	0	3
Indiana:												
Fort Wayne.....	0	0		0	2	0	1	0	0	0	0	2
South Bend.....	0	0		0		0	0	0	0	0	0	
Terre Haute.....	0	0		0		0	1	0	0	0	0	
Illinois:												
Chicago.....	2	0		0	13	3	15	45	7	0	0	84
Springfield.....	0	0		0	1	0	0	0	0	0	0	
Michigan:												
Detroit.....	3	1		0	10	0	3	22	6	0	3	94
Flint.....	0	0		0		1	4	0	1	0	0	8
Grand Rapids.....	0	0		0		0	0	3	2	0	0	18
Wisconsin:												
Kenosha.....	0	0		0	7	0	0	10	0	0	1	3
Milwaukee.....	0	0		0	7	0	4	2	4	0	0	89
Racine.....	0	0		0	10	0	0	0	0	0	0	5
Superior.....	0	0		0		0	0	2	0	0	0	9
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0		0		0	0	3	1	0	0	2
Minneapolis.....	3	0		0	10	0	4	119	6	0	0	
Missouri:												
Kansas City.....	0	0		0		0	4	15	2	0	0	4
St. Louis.....	0	0		0	4	0	4	36	5	0	1	

## City reports for week ended August 3, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyositis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	—	0	—	0	0	14	1	0	0	1
Nebraska:												
Omaha.....	0	0	—	0	—	0	1	16	0	0	0	—
Kansas:												
Topeka.....	0	0	—	0	—	0	0	4	1	0	0	4
Wichita.....	0	1	—	0	—	0	4	0	0	0	0	—
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	—	0	—	0	1	0	1	0	0	—
Maryland:												
Baltimore.....	5	0	—	0	49	0	1	0	3	0	0	29
Cumberland.....	0	0	—	0	—	0	0	0	0	0	0	—
Frederick.....	0	0	—	0	—	0	0	0	0	0	0	—
District of Columbia:												
Washington.....	0	0	—	0	19	0	4	2	2	0	0	10
Virginia:												
Lynchburg.....	1	0	—	0	—	0	0	0	0	0	0	—
Richmond.....	0	0	1	0	4	0	0	4	3	0	1	25
Roanoke.....	0	0	—	0	1	0	0	0	0	0	0	1
West Virginia:												
Charleston.....	2	0	—	0	—	0	0	0	0	0	0	—
Wheeling.....	0	0	—	0	—	0	1	0	1	0	1	1
North Carolina:												
Raleigh.....	0	0	—	0	1	0	0	0	0	0	1	2
Wilmington.....	0	0	—	0	—	0	0	0	2	0	0	—
Winston-Salem.....	0	0	—	0	—	0	1	0	0	0	0	23
South Carolina:												
Charleston.....	0	0	—	0	1	0	0	0	0	0	0	—
Georgia:												
Atlanta.....	0	0	—	0	3	0	3	1	1	0	0	—
Brunswick.....	0	0	—	0	—	0	0	0	0	0	1	—
Savannah.....	0	1	—	0	4	0	2	0	0	0	0	1
Florida:												
Tampa.....	0	0	—	0	—	0	0	0	0	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	—	0	—	0	7	2	0	0	0	6
Nashville.....	0	0	—	0	—	0	4	0	1	0	0	1
Alabama:												
Birmingham.....	0	0	—	0	—	0	2	3	1	0	2	—
Mobile.....	0	0	—	0	—	0	0	2	3	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	—	0	—	0	0	7	0	0	0	—
Louisiana:												
New Orleans.....	0	0	1	0	5	0	5	17	0	0	0	4
Shreveport.....	0	0	—	0	—	0	1	1	0	0	0	—
Texas:												
Dallas.....	1	0	—	0	—	0	4	5	2	0	0	2
Galveston.....	0	0	—	0	—	0	3	0	0	0	0	—
Houston.....	10	0	—	0	2	1	4	2	1	0	0	—
San Antonio.....	0	0	—	0	—	0	5	3	1	0	0	3
MOUNTAIN												
Montana:												
Billings.....	0	0	—	0	5	0	0	0	1	0	0	—
Great Falls.....	0	0	—	0	2	0	1	0	0	0	0	2
Helena.....	0	0	—	0	—	0	0	0	0	0	0	—
Idaho:												
Boise.....	0	0	—	0	—	0	2	0	0	0	0	—
Colorado:												
Denver.....	6	0	1	0	2	0	6	10	15	0	0	3
Pueblo.....	0	0	—	0	—	0	0	1	1	0	0	—
Utah:												
Salt Lake City.....	0	0	—	0	3	0	2	6	1	0	0	3

\*Later information has been received that 1 case reported as smallpox in Salt Lake City, week ended July 27, was chickenpox.

## City reports for week ended August 3, 1946—Continued

	Diphtheria cases	Erysipellitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	2	0	-----	0	6	0	3	1	2	0	0	17
Spokane.....	0	0	-----	0	-----	0	3	4	1	0	0	3
Tacoma.....	0	0	-----	0	4	0	0	3	1	0	0	-----
California:												
Los Angeles.....	7	0	-----	0	15	0	0	25	4	0	3	12
Sacramento.....	0	1	-----	0	-----	0	1	0	2	0	0	-----
San Francisco.....	0	0	-----	0	5	1	6	0	4	0	0	2
Total.....	68	5	4	2	410	10	198	459	153	0	20	736
Corresponding week, 1945.....	48	-----	9	9	384	-----	203	-----	196	0	19	889
Average, 1941-45.....	39	-----	21	15	429	-----	219	-----	200	0	29	1,019

*Anthrax*.—Cases: Philadelphia 1.

*Dysentery, amebic*.—Cases: Chicago 5; Detroit 3; Los Angeles 1.

*Dysentery, bacillary*.—Cases: New York 1; Chicago 1; Charleston, S. C., 3.

*Dysentery, unspecified*.—Cases: San Antonio 5.

*Rocky Mountain spotted fever*.—Cases: New York 1; St. Louis 1; Wilmington, Del., 1; Washington 1; Winston-Salem 1; Memphis 1.

*Typhoid*.—Cases: Chicago 1; Memphis 1.

*Typhus fever, endemic*.—Cases: Atlanta 2; Tampa 1; Nashville 1; New Orleans 5; Dallas 1; San Antonio 1; Los Angeles 1.

<sup>1</sup> 3-year average, 1943-45.

<sup>2</sup> 5-year median, 1941-45.

*Rates (annual basis) per 100,000 population, by geographic groups, for the 84 cities in the preceding table (estimated population, 1943, 33,146,800)*

	Diphtheria case rates	Erysipellitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	10.5	0.0	0.0	0.0	171	2.6	44.6	18.4	45	0.0	2.6	218
Middle Atlantic.....	9.7	0.5	0.5	0.9	33	1.4	28.2	14.3	17	0.0	2.3	73
East North Central.....	5.0	0.7	0.0	0.0	37	2.7	21.0	74.5	20	0.0	2.7	225
West North Central.....	6.9	2.3	0.0	0.0	32	0.0	38.9	473.8	37	0.0	2.3	37
South Atlantic.....	9.8	1.6	1.6	0.0	134	0.0	21.2	11.4	21	0.0	6.5	154
East South Central.....	5.9	0.0	0.0	0.0	0	0.0	76.7	70.8	30	0.0	11.8	41
West South Central.....	31.6	0.0	2.9	0.0	20	2.9	63.1	100.4	11	0.0	0.0	26
Mountain.....	48.8	0.0	8.1	0.0	98	0.0	89.4	138.2	148	0.0	0.0	65
Pacific.....	14.2	1.6	0.0	0.0	47	1.6	20.6	52.2	22	0.0	4.7	54
Total.....	10.7	0.8	0.6	0.3	65	1.6	31.2	72.4	24	0.0	3.2	116

## PLAGUE INFECTION IN CALIFORNIA AND KANSAS

## CALIFORNIA

Under dates of Aug. 6 and 9, 1946, plague infection was reported proved in specimens of tissue and fleas from ground squirrels, *C. beecheyi* collected in California, as follows:

*Placer County*.—A pool of 173 fleas from 49 ground squirrels taken 2½ miles northeast of Tahoe City, Tahoe National Forest, received at the laboratory July 22 and proved positive Aug. 5.

*San Benito County.*—Specimens taken 7 miles east of Tres Pinos: 600 fleas from 42 ground squirrels, collected Apr. 22; 400 fleas from 20 ground squirrels collected Apr. 23; tissue from 5 ground squirrels and 407 fleas from 46 ground squirrels, collected May 30; 407 fleas from 27 ground squirrels collected May 31; tissue from 6 ground squirrels collected July 3; tissue from 27 ground squirrels collected July 5. Specimen taken 5 miles east of Tres Pinos: tissue from 2 ground squirrels and 311 fleas from 12 ground squirrels, collected May 28. Specimens taken 7 miles east and 3 miles south of Tres Pinos: 107 fleas from 12 ground squirrels, collected May 29. Specimen taken 13 miles southeast of Tres Pinos: 41 fleas from 5 ground squirrels, collected May 29.

## KANSAS

*Scott County.*—Plague infection was reported proved on August 2 in a pool of 312 fleas from 49 prairie dogs, *Cynomys* sp., collected on July 20, 12 miles west of Scott City and 6 miles north of State Highway No. 96.

This location is the farthest east in which plague infection has been reported in wild rodents or their ectoparasites in the United States. Localities farthest east in which the infection had previously been reported are Cheyenne and Morton Counties, Kansas, where plague infection was found in fleas from mice (*Peromyscus* sp., and *Reithrodontomys* sp.) in June, July, and August 1945.

## TERRITORIES AND POSSESSIONS

## Panama Canal Zone

*Notifiable diseases—June, 1946.*—During the month of June 1946 certain notifiable diseases were reported in the Panama Canal Zone, and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox.....	66	-----	3	-----	1	-----	9	-----	79	-----
Diphtheria.....	27	-----	1	-----	-----	-----	12	-----	40	-----
Dysentery:	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Amebic.....	1	-----	-----	-----	4	-----	6	-----	11	-----
Bacillary.....	2	-----	-----	-----	1	-----	-----	-----	3	-----
Malaria <sup>1</sup> .....	16	2	5	-----	71	-----	61	5	183	7
Measles.....	18	-----	-----	-----	20	-----	5	-----	43	-----
Mumps.....	1	-----	-----	-----	2	-----	2	-----	5	-----
Pneumonia.....	-----	13	-----	2	45	-----	-----	10	45	25
Tuberculosis.....	-----	21	-----	8	4	-----	-----	6	4	35
Typhoid fever.....	2	-----	-----	-----	-----	-----	2	-----	4	-----
Paratyphoid fever.....	1	-----	-----	-----	-----	-----	-----	-----	1	-----
Whooping cough.....	-----	-----	-----	-----	1	-----	-----	-----	1	-----

<sup>1</sup> 12 recurrent cases.<sup>2</sup> In the Canal Zone only

## Puerto Rico

*Poliomyelitis*.—From January 1 to August 5, 1946, a total of 57 cases of poliomyelitis was reported in Puerto Rico, including 17 cases reported for the first 5 days of August. The last previous year in which there was a moderate outbreak of poliomyelitis was 1942. The following table shows the numbers of cases of poliomyelitis reported by months for 1946 and for the same period of 1942:

Month	1946	1942	Month	1946	1942
January.....	1	0	May.....	2	0
February.....	1	1	June.....	6	1
March.....	3	1	July.....	24	29
April.....	3	0			

## DEATHS DURING WEEK ENDED AUG. 3, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 3, 1946	Correspond- ing week, 1945
Data for 93 large cities of the United States:		
Total deaths .....	7,986	8,152
Average for 3 prior years.....	8,191	
Total deaths, first 31 weeks of year.....	289,518	284,318
Deaths under 1 year of age.....	671	604
Average for 3 prior years.....	635	
Deaths under 1 year of age, first 31 weeks of year.....	19,439	18,846
Data from industrial insurance companies:		
Policies in force .....	67,229,415	67,379,112
Number of death claims.....	11,209	11,574
Death claims per 1,000 policies in force, annual rate.....	8.7	9.0
Death claims per 1,000 policies, first 31 weeks of year, annual rate.....	10.0	10.6

# FOREIGN REPORTS

## CANADA

*Provinces—Communicable diseases—Week ended July 13, 1946.*—During the week ended July 13, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		7		39	208	30	31	31	50	396
Diphtheria		3		16	2	1		2	1	25
German measles				7	11	2		7	2	29
Influenza					2				1	3
Measles		16		87	562	127	56	174	26	1,048
Meningitis, meningococcus						1				1
Mumps		5		13	200	19	35	26	77	375
Pollomyelitis			1	3	2	1				7
Scarlet fever		1	5	25	43	10	3	10	7	104
Tuberculosis (all forms)		5	3	137	67	11	20	49	61	353
Typhoid and paratyphoid fever				11	6	1			14	32
Undulant fever				6	2			2		10
Veneral diseases:										
Gonorrhoea	5	17	19	145	140	66	37	51	108	589
Syphilis	1	8	14	85	100	12	11	8	62	301
Whooping cough		13		34	127	5		17	7	203

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, UNRRA, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

### CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January- May 1946	June 1946	July 1946—week ended—				
			6	13	20	27	
ASIA							
Burma	○	573	247		264	70	
Bassein	○	11	12		2		
Moulmein	○	41	1			2	1
Rangoon	○	4	1	8	8	2	
Ceylon	○	31	10	11			
China:							
Anhui Province	○		12			1 18	
Chekiang Province	○	4	184				1 80
Fukien Province	○	5	22			1 38	
Honan Province	○	13	13			1 3	
Hunan Province	○	1				1 9	
Hupeh Province	○	223	65				
Kiangsu Province	○	1 109	1,821			1 567	
Kwangsi Province	○	449	45			1 10	
Kwangtung Province	○	766	1,558		1 173		
Canton	○	584	1,097		1 169		
Hong Kong	○	45	285	47	30	16	14
Szechwan Province	○	4	36				

<sup>1</sup> For the period July 1-20, 1946.

<sup>2</sup> For the month of July.

<sup>3</sup> Includes imported cases.

<sup>4</sup> For the period July 1-10, 1946.



## CHOLERA—Continued

Place		January- May 1946	June 1946	July 1946—week ended—			
				6	13	20	27
India.....	C	40,920	11,317	826			
Calcutta.....	C	1,384	183	20	25	23	
Chittagong.....	C	7	1				
Madras.....	C	3					
India (French).....	C		1				
Indochina (French):							
Cambodia.....	C		102				
Cochinchina.....	C	778	41				
Bien Hoa.....	C	24					
Chandok.....	C	21					
Mytho.....	C	142					
Saigon-Cholon.....	C	15	20				
Vinh-long.....	C	7					
Japan:							
Formosa (Island of).....	C	48					
Hondo.....	C	118					
Malay States.....	C		27	75	34	56	19
Manchuria.....	C			12			358
Mukden.....	C					27	
Siam (Thailand).....	C	1,613	751	249	341		
Bangkok.....	C	355	32	3	1		4
Straits Settlements: Singapore.....	C	1					

\*For the period July 21-31, 1946.

\*Imported.

## PLAGUE

[C indicates cases; P, present]

AFRICA							
Algeria.....	C	2					
Bechuanaland.....	C	10					
Belgian Congo.....	C	4				1	
British East Africa:							
Kenya.....	C	18	6				
Uganda.....	C	12					
Egypt.....	C	93	52	5	8	8	9
Alexandria.....	C	53	38	2	7	4	5
Ismailiya.....	C	20					2
Port Said.....	C	1	3	1	1	2	2
Suez.....	C	19	11			2	
Libya: Tripolitania—Plague-infected rats			1				
Madagascar.....	C	131	1		1		
Union of South Africa.....	C	1					
ASIA							
Burma.....	C	648	117		80	74	
Bassein.....	C	15	2			2	
Rangoon.....	C	110	16		3	2	5
China:							
Chekiang Province.....	C	145	71				
Fukien Province.....	C	1,908	1,041			92	
Amoy.....	C	49	201				
Foochow.....	C	684	363				
Kiangsi Province.....	C	88	25		19		
Kwangtung Province.....	C	322	62				
Yunnan Province.....	C	26					
India.....	C	11,715	440	43			
Indochina (French): Cochinchina.....	C	1	2				
Japan: Formosa.....	C		5				
Java.....	C	28	2				
Manchuria.....	C	42					
Mukden.....	C	39					
Palestine.....	C		2				
Siam (Thailand).....	C	16	2				
EUROPE							
Great Britain: Malta.....	C	2	4				
Portugal: Azores.....	C	14					
NORTH AMERICA							
Canada: Nova Scotia.....	C					1	

\* For the period July 1-10, 1946.

\* For the period July 1-20, 1946.

\* Imported from the China coast.

\* Pneumonic.

\* Includes 2 cases of pneumonic plague.

\* Suspected.

## PLAGUE—Continued

Place	January- May 1946	June 1946	July 1946—week ended—			
			6	13	20	27
SOUTH AMERICA						
Bolivia:						
Santa Cruz Department.....C	P	12	-----	-----	-----	-----
Tarija Department—Plague-infected rats.....			-----	-----	-----	-----
Ecuador:						
Chimborazo Province.....C		2	-----	-----	-----	-----
Loja Province.....C	6		-----	-----	-----	-----
Peru:						
Lambayeque Department.....C	11		-----	-----	-----	-----
Lima Department.....C	19		-----	-----	-----	-----
Piura Department.....C		14	-----	-----	-----	-----
OCEANIA						
Hawaii Territory: Plague-infected rats.....	7	5	-----	-----	-----	-----

<sup>1</sup>Plague infection was also proved positive in Hawaii Territory on Feb. 5, 1946, in a pool of 29 rats, and on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice. Under date of July 3, 1946, plague infection was reported in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats. Under date of July 17, 1946, plague infection was reported in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats.

## SMALLPOX

[C indicates cases; P, present]

<b>AFRICA</b>						
Algeria.....	C	13				
Basutoland.....	C	8				
Belgian Congo.....	C	1,852	1,251	1,29		1,47
British East Africa:						
Kenya.....	C	459	76	17	28	30
Nyassaland.....	C	178	55	16	10	
Tanganyika.....	C	1,666	1,921	128		
Uganda.....	C	435	45	7		
Cameroon (French).....	C	62	1			1,4
Dahomey.....	C	1,110	9			1,75
Egypt.....	C	269	98	5		
Eritrea.....	C	1,2				
French Equatorial Africa.....	C	154				
French Guinea.....	C	574	96			
French West Africa: Dakar District.....	C	38	1		1	
Gambia.....	C	6	1			
Gold Coast.....	C	749	2		13	13
Ivory Coast.....	C	742	226			1,33
Libya.....	C	52	16	1	41	2
Mauritania.....	C	1				4
Morocco (French).....	C	1,738	81			1,16
Morocco (Int. Zone).....	C	175				
Nigeria.....	C	4,602	417			
Niger Territory.....	C	398	2			1,18
Rhodesia:						
Northern.....	C	247	15	17		
Southern.....	C	1				1
Senegal.....	C	94				
Sierra Leone.....	C	350	11			
Somaland (Italian).....	C	1				
Sudan (Anglo-Egyptian).....	C	33	6	1	1	1
Sudan (French).....	C	1,837	26			1,8
Togo (French).....	C	140	4			1,8
Tunisia.....	C	33				
Union of South Africa.....	C	102	25		P	
<b>ASIA</b>						
Arabia.....	C	1				
Burma.....	C	1,294	219			13
Ceylon.....	C	342	4			
China.....	C	555	47	14	14	22
India.....	C	48,103	4,791	509		15
India (French).....	C	2	1			
Indochina (French).....	C	789	501			
Iran.....	C	24				
Iraq.....	C	5				
Japan.....	C	16,435		40	22	
Malay States.....	C	5	331	49	48	42
Palestine.....	C	2				9

<sup>1</sup> Includes alastrim.<sup>2</sup> Includes delayed reports.<sup>3</sup> For the period July 1-20, 1946.<sup>4</sup> Includes 1 imported case.

## SMALLPOX—Continued

Place	January- May 1946	June 1946	July 1946—week ended—			
			6	13	20	27
ASIA—continued						
Rhodes (Island of).....	C	1				
Siam (Thailand).....	C	13,361	1,292	275	245	
Straits Settlements.....	C	1	22		4	1
Syria and Lebanon.....	C	8				
Turkey (See Turkey in Europe).						
EUROPE						
Czechoslovakia.....	C	24				
France.....	C	14		1		
Germany.....	C	1				
Gibraltar.....	C	3				
Great Britain:						
England and Wales.....	C	47	6			
Malta (Island of).....	C	1	2			
Scotland.....	C	2				
Greece.....	C	114				
Italy.....	C	400	62			
Portugal.....	C	24	10	1	3	
Spain.....	C	14				
Turkey.....	C	11	5			
NORTH AMERICA						
Canada.....	C	2				
Guatemala.....	C	55				
Honduras.....	C	3				
Mexico.....	C	296	26			
SOUTH AMERICA						
Argentina.....	C	62				
Bolivia.....	C	383	89			
Brazil.....	C	115	1	6		
Colombia.....	C	478	47	16		
Ecuador.....	C	39	2			
Paraguay.....	C	180				
Peru.....	C	109				
Uruguay.....	C	17				
Venezuela.....	C	1,598	181			124
OCEANIA						
Hawaii Territory.....	C	1				

1 Includes alastrim.

2 Imported.

3 Includes imported cases.

7 Off-shipping.

## TYPHUS FEVER\*

[C indicates cases; P, present]

<b>AFRICA</b>						
Algeria.....	C	108				
Basutoland.....	C	3	3			
Belgian Congo 1.....	C	1,798	303	20		26
British East Africa: Kenya 1.....	C	20	1			
Egypt.....	C	1,232	66	4		
Eritrea.....	C	288	74	10	8	54
French West Africa: Dakar District.....	C	3				
Libya.....	C	55	11	2	1	
Morocco (French).....	C	2,931	457			115
Morocco (Int. Zone).....	C	52				
Morocco (Spanish).....	C	1				
Nigeria.....	C	26				
Rhodesia, Northern.....	C	1				
Sierra Leone 1.....	C	3				
Tunisia 1.....	C	183				
Union of South Africa 1.....	C	98	59	P		

\*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

See footnotes at end of table.

## TYPHUS FEVER—Continued

Place	January- May 1946	June 1946	July 1946—week ended—			
			6	13	20	27
ASIA						
Arabia <sup>1</sup> .....	C	1				
Burma <sup>2</sup> .....	C				1	
China.....	C	27	18	2	2	3
India.....	C	284				2
Indochina (French).....	C	2	7			
Iran.....	C	137				
Iraq.....	C	114	19	7	7	9
Japan.....	C	26, 527		220	143	
Malay States.....	C		3			
Palestine <sup>3</sup> .....	C	29	2			
Straits Settlements.....	C	1				
Syria and Lebanon.....	C	75	3			
Trans-Jordan.....	C	14	5	2		
Turkey (See Turkey in Europe).						
EUROPE						
Albania.....	C	53				
Austria.....	C	30				
Belgium.....	C	3				
Bulgaria.....	C	824	99		8	
Czechoslovakia <sup>1</sup> .....	C	725	37			
France <sup>1</sup> .....	C	12			2	
Germany.....	C	1, 874				
Great Britain:						
England and Wales.....	C	1				
Malta <sup>2</sup> .....	C	9	1			
Greece <sup>1</sup> .....	C	233	33	8	8	
Hungary.....	C	615	87			3
Italy.....	C	6				
Netherlands.....	C	15				2
Poland.....	C	2, 831	168	26		
Portugal.....	C	3		1		
Rumania.....	C	6, 641	526			
Spain.....	C	5	1			
Sweden <sup>2</sup> .....	C	1				
Turkey.....	C	972	101	8	8	10
Yugoslavia.....	C	2, 219				4
NORTH AMERICA						
Costa Rica <sup>2</sup> .....	C	41	7		1	4
Cuba <sup>2</sup> .....	C	4	6			
Guatemala.....	C	385				
Jamaica <sup>2</sup> .....	C	14	5	3		2
Mexico.....	C	589	166			
Panama (Republic).....	C	2				
Puerto Rico <sup>2</sup> .....	C	35	10	3	6	4
Virgin Islands <sup>2</sup> .....	C	2				5
SOUTH AMERICA						
Argentina.....	C	2				
Bolivia.....	C	109	21			
Chile.....	C	97				
Colombia.....	C	121				
Ecuador <sup>1</sup> .....	C	409	133			
Paraguay.....	C	1				
Peru.....	C	290				
Venezuela <sup>2</sup> .....	C	59	11			
OCEANIA						
Australia <sup>2</sup> .....	C	83	12			
Hawaii Territory <sup>2</sup> .....	C	21	3	1		

<sup>1</sup> Include cases of murine type.<sup>2</sup> For the period July 1-20, 1946.<sup>3</sup> Murine type.

August 30, 1946

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# YELLOW FEVER

[C indicates cases; D, deaths]

Place	January— May 1946	June 1946	July 1946—week ended—			
			6	13	20	27
AFRICA						
Ivory Coast: Bobo Dioulasso.....	C				1	
Nigeria:						
Ibadan.....	C	1				
Kafanchan.....	C		2			
Ogbomosho.....	C	1	39			
Sierra Leone: Pujehun.....	C		1			
SOUTH AMERICA						
Bolivia: Santa Cruz Department.....	D	140				
Brazil: Para State.....	D	1				
Colombia:						
Caqueta Territory.....	D	1				
Magdalena Department.....	D	1				
Santander Department.....	D	1				
Venezuela:						
Tachira State.....	C	4				
Trujillo State.....	C	4				
Zulia State.....	C	4				

<sup>1</sup> Suspected.

<sup>1</sup> 4 of these deaths have been confirmed.

X

# FEDERAL SECURITY AGENCY

## United States Public Health Service

THOMAS PARRAN, *Surgeon General*

### DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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TUBERCULOSIS CONTROL ISSUE NO. 7

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# Public Health Reports

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## EDITORIAL

### WHAT IS EARLY TUBERCULOSIS?

By HERMAN E. HILLEBOE, *Medical Director, Chief Tuberculosis Control Division*

Since the early days of World War II, millions of people have been examined by means of mass radiography. This new technique is rapidly achieving the long-sought goal of X-ray examinations of the lungs of all adults in the United States. This objective can be reached within 5 years if all resources in the country are mobilized and a national plan is executed with speed and efficiency.

Yet a word of caution must be given to prevent indiscriminate diagnoses of pulmonary tuberculosis on the basis of X-ray examination alone. The films of thousands of persons have shown lesions characteristic of early tuberculosis. Even though a fair percentage of these persons have had no tuberculin tests performed, no sputum examined, and no history of symptoms taken to confirm or deny the suspicious film findings, many of them have been labeled as tuberculous. This is scientifically unsound, and because such a practice tends to become commonplace, and damage is done to people and to control programs, we should now take stock of our diagnostic criteria for the clinical determination of early tuberculosis.

Specialists in tuberculosis rightly insist that, before final diagnosis, every attempt be made to obtain sputum specimens, and that such specimens be submitted to meticulous examination; that is, by direct smear of actual or concentrated sputum and, if this is negative, by culture or guinea pig inoculation. If sputum is not present, a testing sample of gastric contents should be obtained and examined by ap-

\*This is the seventh of a series of special issues of *PUBLIC HEALTH REPORTS* devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the *PUBLIC HEALTH REPORTS*. Effective with the July 5 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at \$1.00 per year; \$1.25 foreign.

propriate culture methods in laboratories that employ skilled bacteriologists. In cases of pleural effusion, the same procedure should be followed. This is possible only in an accredited laboratory certified by some impartial central laboratory to perform examinations of unquestioned quality.

If, after such diligent search, no tubercle bacilli are found, the diagnosis should be limited to "suspicious tuberculosis." This does not mean that many of the shadows found on the survey films are not the residue of a tuberculosis process that once was active. (This is especially true when the tuberculin test is positive.) Nor does it mean that the person should not be followed for several years to observe new evidences of disease activity. Nevertheless, to be scientific in our practice of medicine and to preclude needless distress, we should refer to such persons as "suspects" until such time as tubercle bacilli can be demonstrated. A firm stand of this sort should do much to clarify confused thinking in mass radiography diagnosis. To put it simply and candidly: do not diagnose pulmonary tuberculosis on the basis of a screening X-ray film alone.

One must study suspicious cases by means of a careful history, including recent or present symptoms which are characteristic of tuberculosis. For differential diagnosis it is essential to apply the tuberculin test, using the intracutaneous method properly applied and interpreted by an experienced person. In the presence of a negative tuberculin test, other reasons than tuberculosis must be found for suspicious shadows, even though their location or configuration be characteristic. Indeed, even for a person whose film shows a cavity, a negative tuberculin test demands that some other etiological factor than tuberculosis be sought as the cause.

The same criteria used in diagnosis must be even more rigidly applied in the treatment of tuberculosis, especially sanatorium care and chest surgery. Persons whose chest films show shadows, discovered by mass radiography, should not be rushed into the sanatorium simply on the evidence of X-ray findings. A 6-week period of follow-up by the physician or clinic will determine the presence or absence of tubercle bacilli in the sputum, gastric contents, or pleural fluid. Because a social stigma unfortunately often attaches to a diagnosis of tuberculosis, and great personal harm through mental anguish can occur, strict restraint should be practiced in naming the disease before its actuality can be proved. Even those persons whose diagnoses are confirmed will profit by a period of waiting, during which they may become accustomed to the idea of having a serious disease. Such a practice will keep expensive sanatorium beds free for patients who are truly ill and will avoid unnecessary exposure of nontuberculous persons sent to sanatoria by mistake.

Persons who have tuberculosis which requires sanatorium care cannot be greatly harmed by short delay of treatment; in many instances the disease has been present for some time. The chest surgeon, too, should wait and watch with patience until tubercle bacilli are demonstrated as present in the lungs. This is particularly true of the too easily performed procedure of pneumothorax. Before the normal physiology of respiration is permanently changed by surgical attack, there must be strong evidence that such change and its attendant loss of function will be compensated for by the patient's future control of active disease.

There is yet no evidence in medical literature that the minimal lesion case with negative sputum, negative gastric lavage, or no sputum is benefited by sanatorium care. Rather it is a more realistic procedure to seek out and hospitalize the original positive sputum case which infected the minimal case so recently discovered.

We have placed emphasis in these remarks on the asymptomatic case with negative sputum or negative gastric contents. We must, however, be aware of and watch for "indolent" early tuberculosis. Caution is called for in the follow-up of early cases of tuberculosis that present vague findings and symptoms that are often difficult to elicit and interpret. This is the type of tuberculosis which British chest specialists call "indolent early tuberculosis," the prognosis of which we know little. Often such patients when placed under sanatorium care recover rapidly without surgical or special aid. Others deteriorate in the sanatorium in spite of the most expert medical skill and the finest facilities. One wonders if both types of cases would not have pursued the same courses undiscovered and unattended. We do not know why the body responds so indolently in these cases. Intensive investigation should help us find the answer, so that our follow-up program can be realistically directed and thereby made more effective.

To sum up, no person should be labeled with the diagnosis of pulmonary tuberculosis on the basis of incomplete evidence. Suspicious film findings must be corroborated by a positive tuberculin test and by positive bacillary findings. Let treatment be delayed and judiciously deliberated until all the facts are in and all the evidence is evaluated. If such a practice is universally followed, chest physicians will gain considerably in accuracy and skill of diagnosis, and limited hospital resources will be conserved. Most important of all, the person suspected of having tuberculosis will be assured thorough and scientific diagnosis and treatment. Judgments based on positive and complete evidence will give a final verdict that protects the individual and the public health.

## BCG VACCINATION IN DENMARK <sup>1</sup>

By JOHANNES HOLM, *Chief, Tuberculosis Division, State Serum Institute, Copenhagen, Denmark; Advisory Consultant, Tuberculosis Control Division, United States Public Health Service*

In Denmark BCG vaccination of man has been employed since 1927. In the beginning years, however, it was carried out merely as an experiment of limited extent. It was not until about 1940 that vaccination with the bacillus of Calmette and Guérin was employed there extensively, but in late years it has been adopted as an essential weapon in the fight against tuberculosis.

### THE BCG STRAIN EMPLOYED

In 1927 Danish State Serum Institute in Copenhagen received the first BCG strain directly from Calmette, at the Pasteur Institute in Paris. This strain was employed very cautiously: only a few children were vaccinated with it. This was fortunate because the vaccine proved to be far more potent than was expected and gave rise to rather disagreeable complications in the vaccinated children.

The oral method of vaccination was employed at first, and the vaccine was given only to the newborn; Calmette's directions were followed faithfully. Altogether 16 children were vaccinated in this way in 1927, 7 children in 1928, and 22 in 1929. On re-examination of these children in 1930, a considerable number of them were found to be tuberculin-negative, and none showed any sign of tuberculosis.

In September 1930, the intracutaneous method of vaccination, used by Heimbeck, in Norway, and by Wallgren, in Sweden, was begun in Denmark. In the beginning, a dose of 1/100 mg. of BCG vaccine was injected intracutaneously. This was the smallest dose of BCG employed for this form of vaccination in other countries. The dose, however, was found to produce nut-sized local abscesses in the vaccinated children and to leave ulcerations that healed but slowly. In keeping with directions from the Pasteur Institute, the vaccination dose was cut down to 1/1,000 mg., given subcutaneously. This dosage and method resulted in even larger abscesses at the site of vaccination. Intracutaneous injection of 1/1,000 mg. of vaccine also gave rise to large abscesses. It was obvious, then, that the BCG strain employed was too potent, and in 1931 after correspondence with Calmette, the Serum Institute was provided with a new BCG strain from the Pasteur Institute. In comparative experiments with intracutaneous inoculation of guinea pigs, this strain proved to be considerably weaker than the original BCG strain. The first BCG strain gave regular nodules, even when injected in a dose as low as

<sup>1</sup> From the Tuberculosis Control Division.

1/100,000 mg., whereas the new strain gave nodules only in a dose of 1/100 mg. or more. This was the last strain received, and has since been employed exclusively for BCG vaccination in Denmark.

This BCG strain has proved to possess a suitable virulence, so that 0.1 mg. of vaccine culture, injected intracutaneously in man, has not produced too large local reactions at the site of vaccination and, on the whole, has given rise to few complications. At the same time, a very high percentage of the vaccinated individuals have shown a positive tuberculin reaction.

In the course of years the BCG strain has shown some variation in virulence. Originally Calmette stated that BCG was a fixed virus and that he had obtained the attenuation of the initially virulent bovine strain to its present very low virulence by continuous cultivation on bile potato medium. It had been the experience of workers in the Serum Institute in Copenhagen that the BCG strain first received increases in virulence during the period of working with it, even though it was grown continuously on bile potato. As a consequence, the original directions of Calmette for cultivation of the BCG strain were modified.

In Denmark the constancy of virulence of the BCG strain for the production of vaccine has been maintained by growing it on the Sauton medium, with subcultivation about every 2 weeks. Experience has proved this method successful. Periodically, however, the virulence of the strain has weakened slowly under this form of cultivation. When such weakening eventuated, a new increase in virulence was obtained by several passages on bile potato. In more recent years, however, instead of bile-potato passages, a more frequent transfer of the strain on the Sauton medium (every 7 to 10 days) has been employed. This is in keeping with experiments which show that the virulence of the strain depends essentially on the rate of growth of the bacilli on the Sauton medium. With a suitable virulence, the transferred bacilli should cover the entire surface of the medium in the Erlenmeyer flasks employed (capacity of about 180 cc.) in 12 to 14 days. If the surface of the medium is not completely covered by bacterial growth on the fourteenth day, the virulence of the strain is assumed to be weakening, and a higher rate of growth may then be obtained by more frequent transfers.

A low virulence of the strain is evidenced, among other indications, by a relatively large percentage of the vaccinated subjects who show a negative Mantoux reactions in tests performed 6 weeks after vaccination, and by a loss of sensitivity among a relatively high percentage of the vaccinated subjects who gave a positive tuberculin reaction 6 weeks after the vaccination. Table 1 shows these variations after vaccinations performed in 1936-41 (recorded by K. Winge for the Central

TABLE 1.—*Outcome of tuberculin tests, 6 weeks and 1 year after vaccination (after K. Winge)*

Year	Number vaccinated	Tuberculin test administered following vaccination					
		6 weeks			1 year		
		Number tested	Tuberculin negative		Number tested	Tuberculin negative	
			Number	Percent		Number	Percent
1936.....	82	78	6	8	50	1	2
1937.....	169	162	12	7	118	19	16
1938.....	296	280	28	10	203	24	12
1939.....	432	409	26	6	265	25	9
1940.....	635	619	54	9	407	70	17
1941.....	1,243	1,163	29	3	75	1	1

Tuberculosis Dispensary in Copenhagen). Since 1941 we have employed a somewhat more virulent vaccine than previously.

It is of great importance to keep the virulence of the BCG strain exactly at such a level that practically all vaccinated subjects become tuberculin-positive and preserve their sensitiveness to tuberculin as long as possible, and at the same time, to prevent the local reaction at the site of vaccination from becoming too intense and the regional glandular affections too numerous.

#### PREPARATION OF THE VACCINE

The vaccine is prepared from the bacillary membrane in the flasks containing Sauton medium, on which the bacilli have grown for 14 days, and in which the bacillary membrane covers the surface of the medium completely. The culture mass is freed from adherent medium by means of sterile filter paper; then it is weighed and placed in a flask, together with small balls of stainless steel. A slight amount of diluting fluid is added, and the flask is shaken for about 5 minutes in order to make the bacillary emulsion as homogeneous as possible. The diluting fluid consists of one part Sauton medium and three parts sterile distilled water. Sufficient diluting fluid is added to give a bacillary emulsion containing 1 mg. bacterial culture per cubic centimeter.

The bacillary emulsion is distributed in sterile glass ampules (1 cc., 5 cc., 10 cc.) ready for use. The vaccine should be stored in refrigerators, and in Denmark no vaccine that is more than 8 days old is employed. Before using, the ampules should be shaken energetically for the sake of uniform distribution of the bacillary emulsion.

#### NORMAL COURSE OF THE VACCINATION

It is important to make sure prior to the vaccination that the individual concerned is tuberculin negative, and this requires a

Mantoux test with 100 T. U.<sup>2</sup> In Denmark the Pirquet test or the Moro test is not regarded as effective in determining whether a given individual is tuberculin negative. Experience has shown that a considerable number of the subjects examined give a negative reaction to the Pirquet or Moro test, and a positive reaction to the Mantoux test with 100 T. U.

If the subject has been exposed to tubercle bacilli within 6 weeks, the vaccination is not performed immediately after a negative tuberculin test, because it is not possible to exclude the possibility that the subject may be in the preallergic phase. Therefore, after 6 weeks, the tuberculin test (Mantoux, 100 T. U.) is repeated; if this test also is negative, only then is the vaccination performed. During the intervening 6 weeks, the subject must not be exposed to a known case of tuberculosis.

The dose of vaccine employed is 0.1 cc., injected intracutaneously in the deltoid region. The intracutaneous injection is given as superficially as possible, and the injection is performed quite slowly. Too deep an injection, or injury to the tissue by rapid injection, often causes excessively large local abscesses and sometimes affection of the regional lymph gland.

Normally, the vaccination is followed after 4 to 5 weeks by the appearance of a small nodule at the site of vaccination. This nodule increases slowly in size, and about 6 weeks after the vaccination, it perforates the surface of the skin and discharges one or two drops of pus. The resulting small ulceration then persists for a few weeks up to a couple of months, whereafter it heals and leaves a tiny scar. Normally, there is no demonstrable enlargement of the regional lymph glands.

The size of the local affection is measured at the same time the tuberculin sensitiveness of the vaccinated subject is tested, usually 6 weeks after the vaccination. For a number of years, the State Serum Institute in Copenhagen has received reports on every instance of BCG vaccination in Denmark; and there is sufficient evidence, therefore, on which to base an estimate of the normal course of vaccination.

The size of the local affection varies rather markedly, even upon employment of the same vaccine. In addition, the size is dependent also upon the virulence of the vaccine employed, the affection increasing in size with increasing virulence of the vaccine.

Table 2 illustrates the size of the local lesion upon employment of a rather potent vaccine. That this vaccine is fairly strong is evidenced principally by the fact that more than 97 percent of the

<sup>2</sup> One T. U. (tuberculin unit) is 1/50,000 mg. standard P. P. D. = 1/100 mg. standard old tuberculin. In Denmark the Mantoux test is carried out exclusively with purified tuberculin (P. P. D.).



TABLE 2.—*Course of the BCG vaccination. Vaccinations (strong vaccine) performed in tuberculosis dispensaries and hospitals, January–March 1942*

Age, in years	Number vaccinated	Findings 6-9 weeks after vaccination												
		Tuberculin reactions			Extent of local vaccination reaction (diameter in millimeters)									
		Number tested	Negative		Infiltration					Ulceration				
			Number	Per cent	Under 5 mm.	5-9 mm.	10-14 mm.	15 mm. and over	No data	Under 3 mm.	3-4 mm.	5-9 mm.	10 mm. and over	No data
Total.....	1,839	1,784	48	2.7	436	760	318	69	256	600	398	349	20	382
Under 1.....	33	31	0	0	10	7	5	6	5	14	6	5	0	8
1-3.....	37	37	1	.3	8	8	9	6	6	11	11	4	2	9
4-14.....	200	195	3	1.5	38	73	56	12	21	73	32	62	2	31
15 and over.....	1,569	1,521	44	2.9	380	672	248	45	224	592	349	278	16	334

vaccinated subjects give a positive tuberculin reaction 6 to 9 weeks after the vaccination. It will be noticed that the infiltration at the site of the vaccination usually has a diameter of 5 to 15 mm., and that only in 5 percent of the cases is the diameter over 15 mm. Most often the ulceration is less than 5 mm. in diameter, and only in about 1 percent of the cases is it over 10 mm. in diameter.

#### BACKGROUND FOR THE BCG VACCINATION IN DENMARK

A very large part of the young people of Denmark are tuberculin negative. Because it has been known that it is chiefly tuberculin-negative persons who acquire tuberculosis when exposed, BCG vaccination is believed to be a valuable adjunct in the control of tuberculosis.

In Denmark a tuberculin test is invariably performed on every person who is examined for tuberculosis, and everywhere in Denmark this test is carried out with the same technique (Mantoux), the same tuberculin dosage, and even the same tuberculin dilutions. Hence, the results are always directly comparable, and the extensive examinations for tuberculosis carried out in recent years have furnished a large amount of data on the extent of the tuberculous infection in the Danish population.

Great differences of tuberculin reaction percentage are found in various parts of Denmark. This percentage was found to depend to a considerable degree on whether tuberculosis among cattle is prevalent in the district concerned. The tuberculin reaction percentage is considerably higher in districts with a great deal of tuberculosis among the cattle than in districts in which the cattle are nearly or entirely free of the disease. Figures 1 and 2 show some examples of such examinations. In South Jutland, tuberculosis is relatively common among the cattle, whereas in Zealand it has been reduced

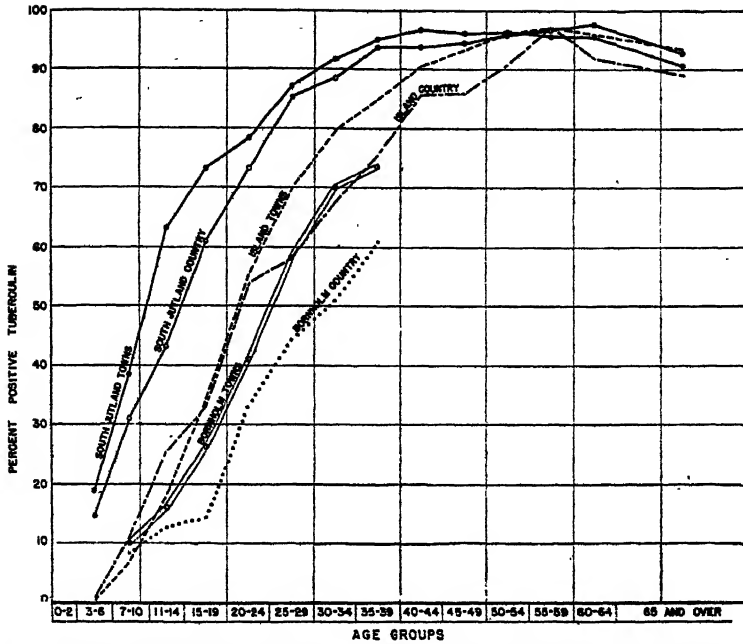


FIGURE 1.—Graphical presentation of tuberculin tests performed by the State Serum Institute, by age groups, 1941-44.

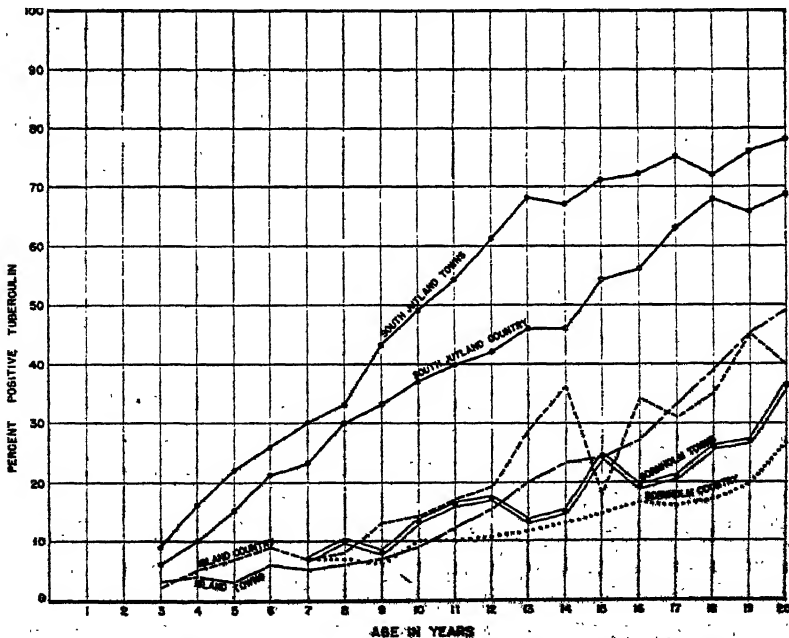


FIGURE 2.—Graphical presentation of tuberculin tests performed by the State Serum Institute, by selected ages, 1941-44.

greatly in recent years and is now almost completely eradicated. On the island of Bornholm, bovine tuberculosis has been eradicated for nearly 20 years.

A reliable conception of the average reaction percentage is obtained from the tuberculin test on the pupils in all the State Schools in Denmark (table 3) performed by the local tuberculosis dispensaries; and on the recruits in the Danish army (table 4), performed by the State Serum Institute and by the Central Tuberculosis Dispensary in Copenhagen.

TABLE 3.—*Tuberculin tests in Danish State schools, by age, 1942-43*

Age, in years	Total			Boys			Girls		
	Tuberculin tests	Positive reactors		Tuberculin tests	Positive reactors		Tuberculin tests	Positive reactors	
		Number	Percent		Number	Percent		Number	Percent
Total.....	5,333	1,834	34.3	3,756	1,276	33.9	9,089	3,110	34.2
10.....	102	15	14.7	76	13	17.0	178	28	15.7
11.....	505	102	20.2	334	62	18.6	839	164	19.5
12.....	682	178	26.1	534	130	24.3	1,216	308	25.3
13.....	700	194	27.7	549	177	32.2	1,249	371	29.7
14.....	709	231	32.6	604	217	35.9	1,313	448	34.1
15.....	852	321	37.7	551	214	38.8	1,403	535	38.1
16.....	795	324	40.8	508	188	37.0	1,303	512	39.2
17.....	642	308	48.0	371	150	40.4	1,013	458	45.2
18.....	279	123	44.1	186	98	52.7	465	221	47.5
19.....	67	38	57.0	43	27	63.0	110	65	59.0

TABLE 4.—*Tuberculin tests on Danish recruits, by age, 1945-46*

Age, in years	Tuberculin tests	Positive reactors	
		Number	Percent
19-23.....	16,998	10,008	58.8
19.....	462	293	63.4
20.....	1,180	688	58.3
21.....	6,267	3,681	58.7
22.....	8,119	4,752	58.5
23.....	970	674	69.4

It will be noticed that at the age of 14 years, about two-thirds of the Danish population gives a negative tuberculin reaction, and that even at the age of 20 to 23 years, one-third of the population still gives a negative reaction.

As there are so many young tuberculin-negative adults in Denmark, there has been ample opportunity to investigate the course of tuberculous primary infections in adults also, obtaining thus an impression of how dangerous it is for man, in Denmark at any rate, to acquire a tuberculous primary infection in adulthood.

In the following discussion of the effect of BCG vaccination, comparisons will be made between tuberculin-positives and tuberculin-

negatives exposed to the same degree. From these comparisons it will be evident that the danger of exposure to tubercle bacilli is considerably greater for the tuberculin-negatives than for the tuberculin-positives. For illustration of the studies on the course of primary tuberculous infection, especially in adults, it will be appropriate here to cite an investigation (by Sigrid Holm) of inverters in Copenhagen. Here the possibility of bovine infection can be excluded.

The study included all the inverters diagnosed in the Central Tuberculosis Dispensary of Copenhagen from August 1, 1935, to January 1, 1941, a total of 1,278 adults and 1,020 children. In all these persons an inversion was ascertained from negative to positive tuberculin reaction. All the reactors were then followed up, until July 1944. The average observation period was 2.3 years for adults, 2.5 years for children.

A great part of the inverters were found at once, at the first examination after the infection, to have demonstrable roentgenographic changes in the lungs. In a good many, the presence of tubercle bacilli was demonstrated in the sputum, or more often, on gastric lavage.

On further follow-up (table 5), a considerable number of these persons developed genuine tuberculosis. Only those patients were reckoned as cases of tuberculosis who showed propagation of the process in the lungs or developed genuine extrapulmonary tuberculosis.

Within the observation period mentioned, nine patients died of tuberculosis: namely, one child and eight adults (four men, four women). It was found that pulmonary tuberculosis, as a rule, developed only in persons in whom roentgenographic changes in the lungs were demonstrated shortly after the inversion from negative to positive tuberculin reaction. Of such adult inverters, about

TABLE 5.—*Follow-up study of inverters to tuberculin, Copenhagen, 1936-41 (after Sigrid Holm)*

Inverters	Total	First examination at time of inversion				Subsequent findings after several years' follow-up					
		X-ray changes		Tubercle bacilli demonstrated		X-ray changes		Genuine tuberculosis			
		Number	Percent of total	Number	Percent of total	Number	Percent of total	Number	Percent—		Of X-ray changes
									Of total		
Total.....	2,298	437	19.0	176	7.7	428	31.4	81	2.5		15.5
Children 1-4 years.....	288	63	21.9	35	12.2	94	32.3	3	1.0		3.1
Children 5-14 years.....	732	163	22.3	59	8.1	171	23.4	16	2.2		2.2
Adults, male.....	665	132	19.8	43	6.5	135	20.3	35	5.3		5.3
Adults, female.....	585	79	13.5	37	6.3	140	23.9	27	4.6		4.6

30 percent acquired genuine tuberculosis, while the percentage was much smaller for children (7 to 14 years, 6 percent, and 1 to 6 years, 3 percent). The propagation of the tuberculous processes took place nearly always within the first 2 years after the infection. In 20 percent of the adults, the propagation was ascertained in the first year after the inversion. In 10 percent the propagation was ascertained in the second year. Propagation was ascertained after 3 to 4 years in 1 percent. Thus, a relatively short observation period should be sufficient to show in how many inverters genuine tuberculosis subsequently develops.

#### DURATION OF THE POSITIVE TUBERCULIN REACTION AFTER BCG VACCINATION

A very important question concerning BCG vaccination is how long the positive tuberculin reaction induced by the vaccination will last.

In Denmark it is reckoned that, in order to be effective, the vaccination must induce a positive tuberculin reaction, and that the effect of the vaccination lasts only as long as the positive tuberculin reaction persists.

The vaccination renders by far the greater majority of vaccinated persons tuberculin-positive. As mentioned, the percentage of persons becoming positive in 6 to 8 weeks after the vaccination has varied somewhat in Denmark. Such variation is plainly dependent upon the virulence of the vaccine.

If the vaccinated subject gives a negative tuberculin reaction 6 weeks after the vaccination, it is recommended to wait about 1 month before a new tuberculin test is made, for a not inconsiderable number of vaccinated subjects give a negative reaction 6 weeks after the vaccination and a positive reaction 10 weeks after. If after 10 weeks, reaction to the tuberculin test is still negative, revaccination must be performed. It is to be assumed that such revaccination will be required in 2 to 5 percent of the vaccinated subjects.

In a relatively small number of cases ( $\frac{1}{4}$  to 1 percent), the tuberculin reaction will remain negative in spite of revaccination. Indeed, these subjects cannot be made to react positively in spite of repeated vaccinations. Occasionally, such persons will have a sensitivity that endures only a very short time.

Ever since the beginning of BCG vaccination in Denmark, it has been a rule to try to perform a tuberculin test on all vaccinated subjects once a year, to see if the effect of the vaccination is preserved. In this way data have been obtained that elucidate the duration of tuberculin sensitiveness in vaccinated persons. Only a small portion

of the data has been analyzed. For many of the vaccinated, the observation period is still rather short.

From table 6 it is evident that as early as 1 year after the vaccination, several of the vaccinated subjects reacted negatively to tuberculin; but the reversion percentage is not as high as was expected. Even 4 years after the vaccination, the great majority of the vaccinated will react positively to tuberculin. This applies not only to persons living in a tuberculous milieu, but also to those outside the tuberculous milieu where the reaction percentage is still high at this juncture.

In Denmark it is now believed justifiable to wait as long as 3 or 4 years before performing tuberculin tests on persons who are not exposed more than normally to tuberculosis. At this time those persons who react negatively can be revaccinated.

#### COMPLICATIONS IN BCG VACCINATION

In Denmark intracutaneous vaccination has been employed exclusively, and hence all experience with complications is limited to this method. A very great majority of the vaccinations are performed by the tuberculosis dispensaries, and as a consequence the vaccination in general has been carried out by relatively few physicians, who thus have gained a considerable practice in its performance. The performance of the vaccination by a trained vaccinator plays a not inconsiderable role. Complications are far more infrequent among the subjects vaccinated in the tuberculosis dispensaries than among the relatively small number of subjects vaccinated by general practitioners.

Among the vaccinations performed by general practitioners, a rather large percentage have been associated with inconveniencing suppuration at the site of vaccination, often accompanied by swelling of the regional lymph glands and, in a few instances, even by suppuration of this gland. The frequency of complications in the subjects vaccinated and re-examined by the tuberculosis dispensaries is illustrated by table 7.

As seen from table 7, the complications have consisted chiefly in an excessive suppuration at the site of the vaccination. In such cases the suppuration may persist for a few months, but then it heals, without any other reaction. The most inconveniencing complication is suppuration of the regional lymph glands. As a rule, this is located either supraclavicularly or in the axilla. Still, after a single puncture of the glandular abscess, the lesion heals. However, this healing may take a considerable length of time—often about half a year. Not infrequently, the glandular suppuration appears long after the vaccination, but most often it makes its appearance after 2 or 3

TABLE 6.—*Tuberculin sensitivity of BCG-vaccinated persons after specific time lapses (after K. Winge)*

[illegible]

TABLE 7.—*Complications following BCG vaccination*

Age when vaccinated	Number vaccinated	Complications		
		Total	Local abscess	Glandular suppuration
Total.....	3,369	26	18	8
Under 1.....	389	13	6	7
1-6.....	533	6	6	—
7-14.....	412	4	3	1
15 and over.....	2,035	3	3	—

months. This lesion requires no particular treatment beyond a single puncture.

These complications are found to appear mainly in children under 6 years. Involvement of the regional lymph glands is seen only rarely in older children or adults.

#### THE PROTECTIVE EFFECT OF BCG VACCINATION

To secure a conclusive estimation of the protective effect of BCG vaccination a long observation period for the vaccinated subjects is required. Because it is only in recent years that the BCG vaccination has been employed to any considerable extent in Denmark, only limited data on this question have been analyzed.

There can be no doubt that vaccination protects against the morbid conditions resulting from a primary tuberculous infection. For elucidation of this point, extensive data are available. But the signal question is whether the vaccination also protects against genuine pulmonary tuberculosis—against phthisis.

In Denmark BCG vaccination has been employed chiefly in tuberculous milieu. In all the tuberculosis dispensaries where the vaccination has been carried out, it has been the general experience that BCG has offered an essential protection. Experiences with BCG vaccination of children have been quite comprehensive. In the tuberculous milieu all the children giving a negative reaction have been vaccinated, also the newborn; and upon showing a positive reaction, they have been permitted to associate with the source of infection at home. Therefore, BCG vaccination has been submitted to severe test. Yet it has been the experience of the Tuberculosis Dispensary of Copenhagen that tuberculosis morbidity and mortality among the children in the tuberculous milieu have been reduced to almost nothing after systematic vaccination has been carried through. Previously tuberculosis mortality among children was high in this milieu, but in recent years no children so exposed have died of



tuberculosis; and those children who become ill have a much milder form of tuberculosis than that previously observed. This fact is plainly seen in those vaccinated children who acquire pulmonary infiltrations. These infiltrations subside within a very short time.

The most important experiences concerning BCG vaccination were gained on the island of Bornholm, with a population of nearly 50,000. As mentioned before, tuberculosis among cattle has been eradicated on this island for about 20 years. Because of this circumstance the percentage of positive tuberculin reactions on Bornholm has been very low in recent years (cf. figs. 1 and 2).

On Bornholm it was ascertained that observed cases of tuberculosis, particularly in young people, occurred chiefly in the tuberculin-negatives. This was found to apply especially to the tuberculin-negative subjects who left the island for some other part of Denmark: a good many of them returned to the island with tuberculosis. Since 1937 it has been emphatically urged that all tuberculin-negative subjects leaving the island should submit to the vaccination; and since 1940 all the tuberculin-negative young persons residing on the island have been, as far as possible, vaccinated.

Figure 3 illustrates the distribution of new recognized cases of tuberculosis on Bornholm distributed by age groups for the two periods of 1936-40 and 1941-45. For the years 1936-40, the age distribution

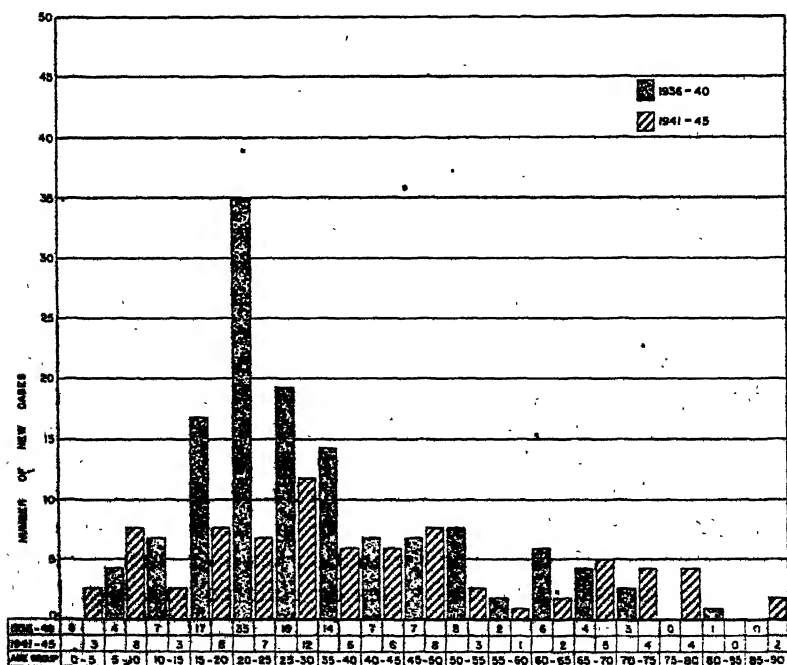


FIGURE 3.—New cases of pulmonary tuberculosis in Bornholm by age groups, 1936-40 and 1941-45.

is similar to that for all of Denmark; that is, most new cases are found in the 15-35 year age group. For the next 5-year period, 1941-45, it will be noticed that there has been a very considerable reduction in the cases of tuberculosis within the age group of 15-35 years—a decrease which must be ascribed to extensive BCG vaccination in these age groups. At the end of 1945, over 10,000 of the population of the island (about 50,000) had been vaccinated, and a majority of the vaccinated subjects belong to the 15-35 year age group.

The most reliable estimation of the protective effect of the vaccination may be reached by observing a group of persons, a part of whom are tuberculin-positive as a result of a natural infection; another part, tuberculin-positive because of vaccination; and another, vaccinated and tuberculin-negative. In Denmark, however, little data of this nature are available.

Still, an example of such research is the examination of the students at the University of Copenhagen. The subjects are divided into two groups, one of which is designated as "particularly exposed". This group comprises medical students, who have reached the clinical part of their studies, under which they are particularly exposed to tubercle bacilli. This is evidenced by the fact that the yearly rate of inversion of this group has been ascertained to amount to 18 percent—in contrast to the yearly rate of inversion of 9 percent for the other students.

From table 8 it will be noticed that the instances of tuberculosis occurrence are far more frequent among the tuberculin-negative students than among the tuberculin-positive, and that no case of tuberculosis is encountered in the group of BCG-vaccinated students.

An epidemic of tuberculosis that occurred in one of the Danish State Schools in 1942 has furnished excellent evidence for elucidating the effect of the BCG vaccination. This school was a secondary girls' school, with pupils aged from 12 to 18 and 19 years. The pupils

TABLE 8.—Continued control observation of students

Reaction to tuberculin or vaccinated	Group	Number of persons	Person-years observed	Medical examinations	
				With X-ray changes	With tubercle bacilli
Positive reactors.....	Total.....	5,971	5,956	17	19
	Especially exposed.....	938	3,249	12	8
	Not especially exposed.....	1,135	2,406	5	4
Negative reactors.....	Total.....	863	1,950	58	31
	Especially exposed.....	322	937	28	17
	Not especially exposed.....	541	1,013	30	4
BCG-vaccinated.....	Total.....	176	217	0	0
	Especially exposed.....	112	222	0	0
	Not especially exposed.....	64	95	0	0

and personnel of the school had been examined for tuberculosis several times before the last time, a couple of months before the appearance of the epidemic, and several of the pupils were BCG vaccinated. Immediately after the epidemic, all the pupils and the entire personnel of the school were again examined for tuberculosis; and in the following 3 years, all the persons exposed in the epidemic were under observation by the local tuberculosis dispensary. As a consequence, a detailed and reliable survey of the cases of tuberculosis produced by the epidemic was possible.

Owing to the appearance of tuberculosis in one of the pupils, all the pupils and personnel of the school had been examined for tuberculosis in 1941 and again 3 months later. At the last examination, BCG vaccination of the tuberculin-negative pupils was advised, and 75 percent of them were vaccinated. In December 1942 the school was examined again. Of the 368 pupils, 263 were found to be tuberculin-positive, of whom 133 had been BCG vaccinated. Altogether, 105 pupils were tuberculin-negative (including 1 who had been BCG vaccinated). The tuberculin-negatives were found chiefly among the new pupils who had entered the school since the last examination. At this examination no sign of tuberculosis was revealed among the pupils or the personnel, and on this account the tuberculin-negatives were not advised at this examination to submit to BCG vaccination.

Then, in January and February 1943, an influenza-like epidemic broke out among the pupils of the school almost explosively. As several of the pupils had an eruption of erythema nodosum at the same time, it was realized that this might be an epidemic of tuberculosis, and a thorough examination of the pupils and personnel of the school was at once undertaken. The first tuberculin test showed that of the 105 pupils who were tuberculin-negative in December 1942, 66 now gave a positive tuberculin reaction. So, it was realized at once that a tuberculosis epidemic was the problem.

The source of infection was found to be a female teacher, in whom minimal processes were demonstrated in one apex, together with positive gastric lavage. Shortly before Christmas she had had a bad "cold." She was teaching natural science exclusively, in a classroom situated in the basement, which because of the war conditions had been transformed into an air raid shelter. Artificial light had to be used continually, and ventilation was poor. She did not teach all the classes. The classes which she taught were found to include many inverters and cases of tuberculosis. This was also true of classes that occupied the classroom immediately after her lessons. In the classes that were not taught by her and did not come into this room, no inverters and no instances of tuberculosis were found.

From table 9 it is plain that this was a very strong tuberculous in-

TABLE 9.—*Tuberculosis epidemic in Aurehoej State school, January–February 1943.*  
(No cases were found on routine examination in December 1942)

Students exposed to teacher with pulmonary tuberculosis <sup>1</sup>	Total	Positive tuberculin, December 1942				Negative tuberculin, December 1942				
		Naturally positive		BCG vaccination <sup>2</sup>		Inverters				
		Total	Cases of genuine pulmonary tuberculosis	Total	Cases of genuine pulmonary tuberculosis	Total	Total	X-ray changes	Tubercle bacilli demonstrated	Cases of genuine pulmonary tuberculosis
Total.....	368	130	4	133	2	105	70	41	37	7
In her class.....	214	73	4	88	2	53	46	26	22	6
In her classroom only.....	91	32	0	18	0	41	24	15	15	1
Subtotal.....	305	105	4	106	2	94	70	41	37	7
Not in her class or classroom.....	63	25	0	27	0	11	0	0	0	0

<sup>1</sup> Source of infection active in December 1942, January 1943.

<sup>2</sup> BCG vaccination, February 1942.

<sup>3</sup> Includes 1 who had been vaccinated February 1942.

<sup>4</sup> 66 were positive reactors by February 1943.

Examined in October 1941 and again in February 1942, BCG vaccination.

Examined in December 1942: No case of tuberculosis (3 inverters).

Source of infection active in December 1942 to January 1943.

Examined in February 1943: See schema (3 years' observation.)

Initial symptoms in 55 inverters (fever, "angina").

Erythema nodosum in 8 (Jan. 21 to Mar. 2, 1943).

Pleurisy in 10 inverters (3 to 11 months after infection).

Tuberculous peritonitis in 1 inverter (16 months after infection).

fection, because among the tuberculin-negative pupils in the classes instructed by this teacher an inversion percentage of no less than 85 was ascertained; and in the classes occupying this room after her lessons and not instructed directly by her, the inversion percentage was 59. Such a high inversion percentage within a period of 3 months has not been observed at any other time in Denmark, and it seems likely that the marked spreading of the infection was due, to a considerable degree, to the circumstance that the infection took place in a blacked-out room.

The primary phenomena of the illness, which must be ascribed to the pulmonary infection, occurred exclusively in the previously tuberculin-negative pupils and in no instance among the BCG-vaccinated. So here is strong proof of the protection given by BCG vaccination against the complications accompanying the primary infection. Observation in the following 3 years has shown that of the originally tuberculin-negative pupils (the inverters), one died of tuberculosis and six acquired genuine pulmonary tuberculosis. Among the pupils who originally, in December 1942, were tuberculin-positive, six cases of genuine pulmonary tuberculosis appeared, two of them among the BCG-vaccinated.

On comparison of the group of BCG-vaccinated with the tuberculin-negative group, it is found that BCG vaccination has offered a considerable degree of protection against the development of genuine pulmonary tuberculosis. On comparison of the BCG-vaccinated group with the group of tuberculin-positive from natural infection, the BCG vaccination is found to have given at least as effective a protection against genuine pulmonary tuberculosis as has the natural infection.

All told, it seems safe to state that BCG vaccination gives an almost complete protection against the morbid conditions accompanying the tuberculous primary infection and also a considerable degree of protection against genuine pulmonary tuberculosis. This protection, however, is not absolute, since in every fairly large study group, there will be a few instances of pulmonary tuberculosis among the BCG-vaccinated subjects.

#### EMPLOYMENT OF BCG VACCINATION IN DENMARK

In Denmark, in recent years, the employment of BCG vaccination has been increasing greatly—as is evident from table 10, which shows the number of vaccinated persons in Denmark in the various years. Prior to 1940, the vaccination was limited chiefly to persons particularly exposed (medical students, the personnel of tuberculosis hospitals and sanatoria, persons living in a tuberculous milieu). Since then, however, the employment of the vaccination has been extended considerably. In the last few years, several tuberculosis dispensaries have advised vaccination of all tuberculin-negative persons encountered in milieu and serial examinations.

In Denmark the significance of the BCG vaccination has been appreciated widely, so that now such vaccination is rarely refused. In recent years, moreover, the vaccination has been applied to all tuberculin-negative soldiers in the Danish army. Early this spring, in Copenhagen, a general examination of the population for tuberculosis, combined with BCG vaccination, was begun. In the course of about half a year, nearly all the persons of 15 to 35 years will be examined, and the tuberculin-negative will be vaccinated.

TABLE 10.—*Number of BCG vaccinations in Denmark in 1934-45*

Year	Number of persons vaccinated	Year	Number of persons vaccinated
1934	82	1940	3,100
1935	118	1941	7,000
1936	283	1942	20,000
1937	1,000	1943	38,000
1938	1,600	1944	40,000
1939	2,700	1945	40,000

Hitherto we have vaccinated only children living in a tuberculous milieu. Vaccination of school children has not been employed to any great extent, being limited to schools in which infection sources exist. Otherwise the vaccination of the school children has been limited to those who are 14 years or older. But as tuberculosis occurs rather frequently within the age class of 7 to 14 years, there is now a strong tendency in Denmark to adopt vaccination of all school children.

#### CONCLUSIONS

BCG vaccination is absolutely safe.

When the proper technique of vaccination is employed by experienced vaccinators, the complications after BCG vaccination are relatively few.

It is very important to keep the virulence of the BCG strain at the proper level and to watch closely the variations of its virulence.

The vaccination gives considerable, but not absolute, protection. It protects almost completely against the morbid phenomena accompanying the tuberculous primary infection, and it also affords a considerable protection against genuine tuberculosis of the various organs—in particular, against phthisis.

### CONTROL OF BOVINE TUBERCULOSIS IN THE UNITED STATES<sup>1</sup>

A picture of grazing cattle appeared for many years on the cover of Farmers' Bulletin 1069, United States Department of Agriculture. This quiet pastoral, depicting the first herd in the United States officially accredited as free of tuberculosis, symbolizes a great victory over one of the deadliest enemies of man.

This victory was an important step in a Nation-wide program to eradicate bovine tuberculosis from the United States. The history of the program is long; the battle is still being fought. But a record of considerable progress may now be reviewed.

The United States Department of Agriculture undertook the huge task of bovine tuberculosis eradication on July 1, 1917, when it established the Tuberculosis Eradication Division of the Bureau of Animal Industry (1). Since the early years of this program, the proportion of cattle tested that have given a positive reaction has decreased from about 4 percent to less than one-quarter of 1 percent (2).

<sup>1</sup> From the Office of the Chief, Tuberculosis Control Division, U. S. Public Health Service, based upon Statistical Tables Showing Progress of the Eradication of Tuberculosis in Livestock and Poultry in Cattle in the United States, published Nov. 1, 1945, by the Tuberculosis Eradication Division, Bureau of Animal Industry, U. S. Department of Agriculture.

The groundwork for the eradication of bovine tuberculosis was laid by Robert Koch in 1882, when he discovered the *Mycobacterium tuberculosis*, or tubercle bacillus. The organism may be of human, bovine, or avian type. The bovine tubercle bacillus is clearly differentiated from other forms, and has a wide range of pathogenicity for different animal species. Human beings and swine are particularly susceptible. The type of tubercle bacillus that causes tuberculosis in man can be unquestionably demonstrated by laboratory methods (3). In Denmark, examinations of tuberculosis specimens are routinely conducted on a differential basis (4).

The bovine tuberculosis eradication program in the United States did not evolve primarily as an altruistic plan to protect humans from infection, but as a sound approach to increasing the value of herds. As far back as 1890, tuberculin was used in the United States for testing cattle. In 1896 Pennsylvania established its Bureau of Animal Industry, and tested 5,430 animals with tuberculin, finding 21.9 percent positive reactors. The test was not given to those that were suspected of having tuberculosis (5).

Nation-wide tuberculosis eradication in cattle and other animals did not gain momentum until the Federal program was established in 1917. Various States passed legislation in accordance with the Federal plan, and Federal veterinarians, under Civil Service, developed a testing program that is still in effect. The plan was that of "cleaning up" one area at a time. The goal was to rid every county in the United States of bovine tuberculosis and to keep every county free of the disease.

There may be a choice of testing method, but usually two methods are employed, so that one may be checked against the other. Tuberculin may be injected intradermally, and when this method is used, the injection is generally made near the base of the tail. The reaction is positive if there is a red swollen area 72 to 120 hours after injection. The ophthalmic test consists of introducing tuberculin into one eye, the other serving as a "control." A positive reaction is obtained when there is characteristic swelling and discharge 3 to 10 hours after application. A third method is the subcutaneous injection of a sufficient quantity of tuberculin to cause a rise in the temperature of infected animals. There must be a series of temperature readings before the injection, and up to 24 hours afterward.

Since it is not practicable to X-ray cattle as human beings are X-rayed, there is no means of learning what type of lesion the animal may have. Those with positive reactions must therefore be slaughtered, in order to determine the extent of disease and to protect both well cattle and humans. Thus, infected animals are constantly eliminated from herds.

The testing program has been conducted by veterinarians, under Federal and State jurisdictions. Indemnities from State and Federal funds are paid to owners who have suffered losses through the slaughter of tuberculous cattle, but on the whole the losses are balanced by various gains. The owner of an "accredited free herd" gains by a bonus in selling price for grade and breeding cattle, by freedom to ship, for a period of 1 year, to out-of-State markets without inspection, by increased milk production, and healthier animals. Some of the slaughtered cattle, moreover, show no further evidence of tuberculosis. Often only portions of the carcasses are condemned. There has been a considerable amount of salvage in the program. Standards are followed that have been established by the Federal Meat Inspection Division, which determines how the infected meat may be used, and how much of it must be sterilized.

Two hundred and eighty-nine thousand head of cattle, the positive reactors among 9,700,176 tested, were slaughtered in 1927. Upon examination, veterinarians determined that only 9.5 percent of this number must be condemned as unsuitable for human consumption, and even of those condemned, some were sterilized and made fit to eat. By 1945 this total decreased to approximately 19,000 reactors for slaughter, of which only 959 were condemned (see table 1).

Each State cooperated with the Department of Agriculture in this program. The separation of the diseased animals from the healthy was the basic objective. An "accredited herd" is one that has passed two annual tuberculin tests without reactors. The second annual test must be a combination of at least two methods of applying tuberculin. Under these conditions the accredited herd is one that is almost certain to be free of tuberculosis. In 1923 the concept of "modified accredited areas" developed, and time has proved it to be of value. Before an area can qualify as such, all the cattle must have been tuberculin tested. The positive reactors are slaughtered, and the herd is later retested. Areas are considered "tuberculosis free" if less than 0.5 percent of the cattle react.

The bovine-testing program has been conducted in county after county, in State after State. It required 10 years for North Carolina to become the first State in which every county showed testing results of less than 0.5 percent positive reactors among its cattle. The remaining States and Territories gradually become free of tuberculosis. In November 1940, after 23 years of concerted effort, every one of the 3,071 counties in the United States, including the District of Columbia, was a modified accredited free area (see table 2).

Reports of the Meat Inspection Division of the Department of



TABLE 1.—*Losses of cattle, excepting reactors, due to relensions for tuberculosis (not including parts of carcasses), fiscal years 1916-45*

[From Federal meat-inspection records]

Fiscal year	Cattle slaughtered minus reactors	Carcasses retained minus reactors		Carcasses condemned and sterilized minus reactors, and percent of slaughter	
	Number	Number	Percent	Number	Percent
1916.....	7,387,051	173,754	2.35	39,218	0.53
1917.....	9,276,049	195,488	2.11	46,214	.53
1918.....	10,912,417	196,917	1.8	46,335	.42
1919.....	11,212,543	176,250	1.57	42,729	.38
1920.....	9,666,188	157,016	1.62	39,305	.41
1921.....	8,137,982	132,068	1.62	33,312	.41
1922.....	7,795,323	146,945	1.87	34,712	.45
1923.....	8,934,975	156,738	1.75	41,113	.46
1924.....	9,049,342	141,595	1.56	39,333	.43
1925.....	9,595,969	145,012	1.51	40,374	.42
1926.....	9,817,599	138,506	1.41	41,125	.42
1927.....	9,810,797	112,924	1.15	31,755	.32
1928.....	8,837,882	91,856	1.04	26,664	.29
1929.....	8,120,992	81,276	1.0	21,265	.26
1930.....	8,119,760	61,192	.75	15,487	.19
1931.....	8,061,749	50,725	.63	12,430	.15
1932.....	7,793,878	38,446	.5	9,307	.12
1933.....	7,554,258	31,971	.42	7,993	.11
1934.....	9,476,141	34,509	.36	9,329	.10
1935.....	12,563,474	30,569	.24	8,273	.07
1936.....	10,215,227	19,078	.19	4,856	.05
1937.....	10,853,778	15,816	.15	4,003	.04
1938.....	9,934,984	11,668	.12	2,828	.03
1939.....	9,515,754	10,090	.11	2,395	.03
1940.....	9,530,642	8,384	.09	1,998	.02
1941.....	10,102,594	8,029	.07	1,868	.02
1942.....	11,743,465	7,255	.06	1,865	.015
1943.....	11,559,167	5,630	.04	1,440	.012
1944.....	12,900,844	5,773	.04	1,628	.01
1945.....	14,504,806	5,830	.04	1,539	.01

TABLE 2.—*Tuberculosis-free accredited herds and cattle, fiscal years 1918-45*

End of fiscal year—	Herds	Cattle	End of fiscal year—	Herds	Cattle
1918.....	204	6,945	1932.....	174,648	2,863,434
1919.....	782	19,021	1933.....	194,349	3,172,575
1920.....	3,370	82,986	1934.....	225,809	3,396,553
1921.....	8,201	193,620	1935.....	238,937	3,514,242
1922.....	16,216	363,902	1936.....	256,036	3,746,955
1923.....	28,526	615,156	1937.....	275,744	3,912,652
1924.....	48,273	920,370	1938.....	289,095	3,807,142
1925.....	72,383	1,275,063	1939.....	362,972	3,829,941
1926.....	96,392	1,577,037	1940.....	284,757	3,743,951
1927.....	130,476	1,885,072	1941.....	263,405	3,925,112
1928.....	169,356	2,265,938	1942.....	259,775	3,913,405
1929.....	170,996	2,290,043	1943.....	246,611	3,637,412
1930.....	182,558	2,646,686	1944.....	243,551	3,828,556
1931.....	156,596	2,619,261	1945.....	237,991	3,751,942

Agriculture provide a measure of the progress made by the Tuberculosis Eradication Division. Animals slaughtered under Federal supervision are inspected for disease of all kinds. Farmers' Bulletin 1069, revision of 1939, contains a table showing the losses from tuberculosis among cattle slaughtered for general purposes, excluding the positive reactors to the tuberculin test. In 1920, 1.62 percent of all animals slaughtered were condemned for tuberculosis; whereas in 1938, only 0.03 percent were condemned. As those infected were eliminated from the herds, fewer cattle going to market were condemned because of tuberculous infection.

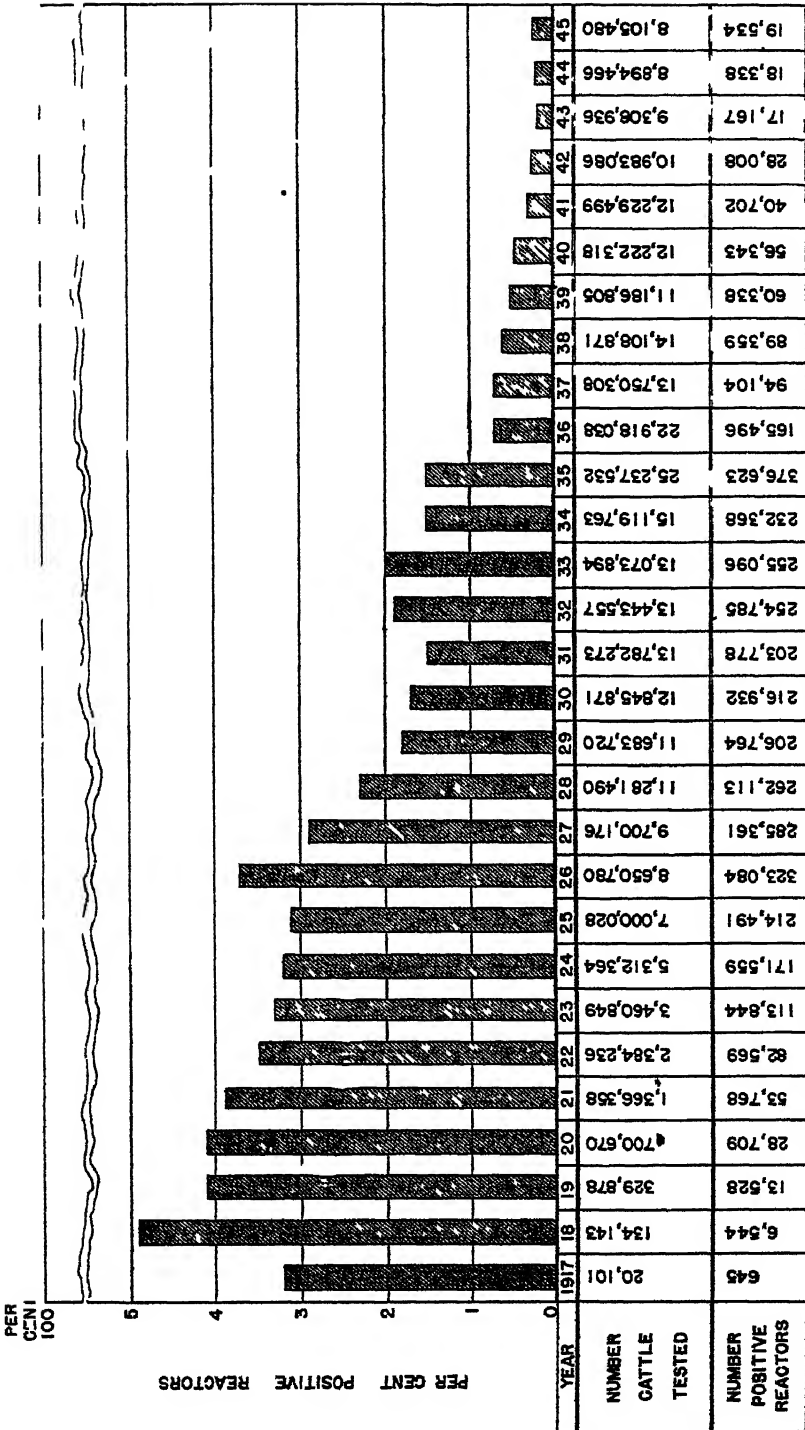


FIGURE 1.—Annual results of tuberculin testing of cattle, United States 1917—45.

In a recent publication, the Tuberculosis Eradication Division of the Department of Agriculture has included tables from which the whole campaign against bovine tuberculosis can be reviewed (2). Figure 1 shows the annual results of bovine tuberculin testing. The program started in 1917, with the examination of 20,101 head of cattle. The peak year was 1935, when the Division tested 25,237,532 head. Addition of the yearly totals reveals that the number tested through 1945 was about 280 million, with about 4 million positive reactors. This represents an average of 1.4 percent positive reactors since 1917.

Eight million, one hundred and five thousand, four hundred and eighty head of cattle, in 484,749 herds, were tested in 1945. Of these, only 19,534 (0.24 percent) were positive reactors. This may be compared with the figures for 1918, when 134,143 head were tested, with 6,544 positive reactors (4.9 percent). The 1945 percentage is only one-twentieth of the 1918 percentage (4.9 as compared with 0.24).

Figure 1 shows a fairly steady decrease in the percent of positive reactors until 1943, when it reached the low of 0.18. The following two war years reveal an increase. In 1944, there were 0.20 percent positive reactors; in 1945, 0.24 percent (see also table 4).

It is significant that bovine tuberculosis has been on the increase since 1943. The increase may be largely attributed to the war. The dislocation of personnel trained in keeping herds free of tubercu-

TABLE 4.—Annual results of tuberculin testing of cattle, fiscal years 1917–45

Fiscal year	Cattle tested	Reactors	
		Number	Percent
1917	20,101	645	3.2
1918	134,143	6,544	4.9
1919	329,878	13,528	4.1
1920	700,670	28,709	4.1
1921	1,366,358	53,768	3.9
1922	2,394,236	82,569	3.5
1923	3,480,949	113,844	3.3
1924	5,312,364	171,559	3.2
1925	7,000,028	214,491	3.1
1926	8,650,780	323,084	3.7
1927	9,700,176	285,361	2.9
1928	11,281,460	262,113	2.3
1929	11,683,720	206,764	1.8
1930	12,845,871	216,932	1.7
1931	13,782,273	203,778	1.5
1932	13,443,587	264,785	1.9
1933	13,073,894	255,096	2.0
1934	15,119,763	232,368	1.5
1935	25,237,532	376,623	1.5
1936	22,918,038	165,496	.7
1937	13,750,306	94,104	.7
1938	14,108,871	99,359	.6
1939	11,186,805	60,338	.5
1940	12,223,318	55,343	.45
1941	12,229,499	40,702	.3
1942	10,983,086	28,008	.26
1943	9,308,996	17,167	.18
1944	8,894,466	18,338	.2
1945	8,105,480	19,534	.24
Total	279,235,490	3,891,950	1.4

losis resulted in the influx of many workers with no knowledge of protective measures; infected herds that had been more or less isolated within their own farm boundaries were sold to owners of apparently well herds; owner dislocation occurred; fewer veterinarians were available; and tuberculosis infection spread.

In 1945, there were 0.24 percent positive reactors in the States and Territories. The following table gives the data by States for that year. In all, 8,105,480 head of cattle were tested, of which 19,534 were positive. Hawaii and New Jersey, with, respectively, 1.3 and 1.26 percent positive, showed the most infection, while the District of Columbia, Nevada, and the Virgin Islands showed no positive reactors (see table 5).

TABLE 5.—*Tuberculin testing of cattle, by States, fiscal year 1945*

	Herd tested	Cattle tested	Reactors found	Percent reactors	Infected premises
Total.....	484,749	8,105,480	19,534	0.24	7,743
Alabama.....	957	22,112	18	.08	11
Arizona.....	2,716	40,776	118	.28	67
Arkansas.....	1,584	17,052	9	.05	8
California.....	28,748	673,247	1,126	.16	328
Colorado.....	1,968	23,919	77	.32	56
Connecticut.....	12,653	184,893	534	.29	179
Delaware.....	2,219	41,096	63	.15	27
District of Columbia.....	1	199	0	0	0
Florida.....	1,908	51,400	17	.03	9
Georgia.....	1,158	15,794	87	.55	4
Idaho.....	2,140	31,309	46	.14	12
Illinois.....	51,571	753,119	1,753	.23	867
Indiana.....	11,867	153,212	301	.19	207
Iowa.....	22,578	445,421	1,702	.38	1,033
Kansas.....	2,153	39,241	153	.39	109
Kentucky.....	1,679	27,607	84	.3	26
Louisiana.....	1,240	29,269	46	.16	18
Maine.....	1,306	15,410	15	.1	9
Maryland.....	11,715	209,748	250	.12	114
Massachusetts.....	14,682	206,783	400	.19	191
Michigan.....	22,183	271,806	622	.23	379
Minnesota.....	28,005	566,538	593	.1	377
Mississippi.....	2,132	24,209	13	.05	5
Missouri.....	2,396	40,483	2	.005	2
Montana.....	831	21,645	16	.07	8
Nebraska.....	1,896	37,979	124	.33	46
Nevada.....	108	1,557	0	0	0
New Hampshire.....	10,161	119,548	81	.07	52
New Jersey.....	16,231	245,006	3,098	1.26	712
New Mexico.....	1,045	12,894	12	.9	11
New York.....	72,170	1,416,401	2,697	.19	952
North Carolina.....	1,862	42,123	8	.02	5
North Dakota.....	1,171	27,336	56	.13	26
Ohio.....	26,023	283,856	382	.13	178
Oklahoma.....	2,255	52,658	102	.19	81
Oregon.....	13,347	118,092	412	.35	206
Pennsylvania.....	29,132	370,151	1,834	.5	586
Rhode Island.....	2,125	30,909	209	.68	83
South Carolina.....	642	14,321	8	.06	2
South Dakota.....	1,607	41,223	110	.27	48
Tennessee.....	466	11,997	48	.4	8
Texas.....	7,316	149,557	169	.11	51
Utah.....	5,108	22,845	72	.31	69
Vermont.....	8,882	206,863	206	.14	116
Virginia.....	3,910	91,935	128	.14	62
Washington.....	17,765	146,851	243	.17	89
West Virginia.....	2,591	37,615	8	.21	8
Wisconsin.....	23,630	574,739	808	.15	217
Wyoming.....	2,042	28,738	39	.14	28
Hawaii.....	234	17,746	231	1.3	30
Puerto Rico.....	2,451	88,534	289	.33	97
Virgin Islands.....	6	685	0	0	0

Any discussion of bovine tuberculin testing programs should include the information that the United States Department of Agriculture has cooperated with various States in eradicating tuberculosis among fowl and swine. Since 1925 the Department has been working with avian tuberculosis eradication (see table 6). Flocks have been under the supervision of veterinarians assigned to avian projects, and the percent found to be infected has been reduced from 6.2 in 1925 to 3.0 in 1945. Tuberculosis infection in birds is characterized pathologically by intestinal ulceration and by tubercle formations in the viscera. Infection of fowl by way of the alimentary tract is readily accomplished experimentally, and it is believed that this is the usual route of entry.

TABLE 6.—*Avian tuberculosis eradication work in cooperation with various States, fiscal year 1945. Results of inspections of poultry by veterinarians assigned to the avian project*

	Tested		Reactors to tuberculin tests		Inspections		Clinically affected		Total flocks under supervision
	Flocks	Fowls	Flocks	Fowls	Flocks	Fowls	Flocks	Fowls <sup>1</sup>	
Illinois.....	455	63,947	276	4,300	2,038	309,019	109	18,198	9,279
Indiana.....	32	7,063	12	116	1,862	202,088	139	35,538	1,250
Kansas.....	32	5,568	16	53	923	167,537	2	231	2,639
Michigan.....	347	83,379	45	207	0	0	0	0	347
Minnesota.....	198	25,035	73	813	962	114,926	0	0	1,833
Nebraska.....	324	3,651	110	393	1,220	209,008	108	19,110	3,085
Ohio.....	5	934	3	21	939	197,233	8	8	17,543
South Dakota.....	336	90,519	86	1,948	1,381	264,252	152	29,294	5,309
Totals.....	1,729	270,086	621	7,751	9,325	1,464,063	513	102,379	41,285

<sup>1</sup> Represents all birds in flocks, both infected and healthy.

It is known that infection occurs by this route in other susceptible animals, particularly swine, that feed on the same ground. Because swine frequent barnyards and readily contract tuberculosis of both the avian and bovine types, tuberculin testing followed by the slaughter of swine with positive reactions has been conducted since 1921. Almost a million swine were slaughtered in 1945 because of tuberculous infection. Last year alone, 12,445 carcasses (0.025 percent) were condemned, eliminating the possibility of spreading the infection to other animals, or to persons who might have eaten the meat (see table 7).

The Tuberculosis Eradication Division has the specific objective of "completely eradicating bovine tuberculosis in the future." During the war, about 200 veterinarians left the Division to join the armed forces, but many are returning to complete the task. Recent figures show a slight decrease in the percentage of positive reactors among cattle tested. In 1946 the percent of reactors was 0.23, decreasing 0.01 percent from the previous year. Funds for 1947 will be sufficient to carry on the program. The Federal Government has

budgeted about \$500,000 for indemnities, and the States, \$1,375,000 for indemnities and \$2,750,000 for operating expenses.

TABLE 7.—*Losses of swine due to retentions for tuberculosis, fiscal years 1921-45*

[From Federal meat-inspection records]

Fiscal year	Swine slaughtered	Carcasses retained		Carcasses sterilized and percent of slaughter		Carcasses condemned and percent of slaughter	
		Number	Percent	Number	Percent	Number	Percent
1921.....	37,702,866	4,693,305	12.4	96,234	0.26	64,530	0.17
1922.....	39,416,439	5,640,031	14.3	95,809	.24	70,304	.18
1923.....	48,600,069	7,139,925	14.7	113,802	.23	85,688	.18
1924.....	54,416,481	8,293,965	15.2	125,000	.23	100,110	.18
1925.....	48,459,608	7,039,724	14.5	104,328	.22	86,232	.18
1926.....	40,442,730	5,067,093	14.0	81,646	.2	63,748	.16
1927.....	42,650,443	5,778,009	13.5	73,232	.17	59,656	.14
1928.....	48,347,393	5,872,503	12.1	69,768	.14	55,749	.12
1929.....	47,163,573	5,408,910	11.5	58,030	.12	46,624	.1
1930.....	46,689,860	5,321,862	11.4	53,781	.12	42,381	.09
1931.....	44,020,033	5,174,343	11.8	49,549	.11	38,805	.09
1932.....	45,852,422	5,222,420	11.4	45,651	.1	37,509	.08
1933.....	45,698,053	4,820,172	10.5	40,769	.09	35,680	.08
1934.....	45,773,196	5,102,636	11.1	37,686	.08	40,038	.09
1935.....	34,413,317	3,714,828	10.8	36,564	.08	26,133	.08
1936.....	28,506,019	2,925,593	10.3	16,399	.06	15,195	.05
1937.....	36,226,309	3,435,433	9.5	17,666	.05	15,854	.04
1938.....	32,543,905	2,964,201	9.1	13,665	.04	12,423	.04
1939.....	38,656,537	3,418,805	8.8	15,160	.04	13,190	.03
1940.....	46,673,925	4,076,996	8.7	18,148	.04	16,015	.03
1941.....	48,710,059	4,014,021	8.2	15,907	.03	15,317	.03
1942.....	50,133,871	3,991,333	8.0	14,413	.03	13,357	.03
1943.....	56,867,080	4,056,918	7.1	13,660	.02	13,051	.02
1944.....	74,946,117	5,185,294	6.9	15,744	.02	15,910	.02
1945.....	49,468,458	3,556,582	7.2	10,396	.02	12,445	.025

With the return of personnel, and with sufficient Federal and State funds for fiscal 1947, the goal may yet be attained. In the future, our cattle, fowl, and swine may be entirely free of bovine tuberculosis.

#### SUMMARY

The Tuberculosis Eradication Division, Bureau of Animal Industry, United States Department of Agriculture, first tested cattle for tuberculosis in 1917, finding 3.2 percent positive reactors.

The percent of positive reactors to the tuberculin test decreased almost continuously until 1943, when it was 0.18. In 1945, there were 0.24 percent positive reactors. The percentage for 1946 is 0.23.

After 23 years of control work, all counties and Territories of the United States were modified accredited free areas.

#### REFERENCES

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- (4) Holm, J.: *Tuberculosis in Denmark*. (To be published in *PUBLIC HEALTH REPORTS*, 61: (40): (Oct. 4, 1946)).
- (5) Bruner, S. E.: *Progress of Tuberculosis Eradication in Pennsylvania*. Circular 131, State Department of Agriculture, New Jersey, Nov. 1927.

## CHARACTERISTICS OF COMMERCIAL X-RAY INTENSIFYING SCREENS

Resolving power constitutes a measure of the ability of X-ray films and screens to record detail and is determined by radiographing on the film or screen under standard conditions a graduated series of linear patterns. It is expressed as the maximum number of lines per millimeter that can be distinguished on the processed film. The resolving power of radiographic intensifying screens is considerably less than those of films, and therefore measurements of film-screen combinations are essentially the resolving power of the screens alone. Screens with the highest resolving power are capable of recording the greatest detail.

### *Resolving power of commercial screens*

Manufacturer	Type	Resolving power	Use	Note
Buck-----	Xtra speed-----	10	Intensifying-----	1 thick and 1 thin screen. 2 thin screens.
	do-----	10	do-----	
	Midspeed-----	12½	do-----	
	Definition-----	12½	do-----	
Eastman-----	Ultra speed-----	9½	do-----	
	Fine grain-----	10	do-----	
	Definition-----	12½	do-----	
Patterson-----	Detail-----	17½	do-----	
	Fastspeed-----	10	do-----	Regular. Cleanable. Regular. Cleanable.
	Type D-----	17	Fluorographic-----	
	do-----	17	do-----	
	Type B-----	16	Fluorographic and fluoroscopic-----	
	do-----	16	do-----	Cleanable.

<sup>1</sup> These figures are for screens alone. When used in photofluorography, the additional effect of the lens must be taken into consideration.

### *Basic specifications for 70-mm. photofluorographic equipment recommended by the Tuberculosis Control Division, United States Public Health Service*

1. Photofluorographic film: Blue sensitive type.
2. Photofluorographic screen: Blue emitting type (Patterson type D or equivalent).
3. Width of photofluorographic screen: 15 inches.
4. Target-screen distance: 40 inches.
5. Distance between centers of successive frames on film roll: 3¼ inches.
6. Stereoscopic tube shift: 2¼ inches.

# PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

July 14-August 10, 1946

The accompanying table (table 1) summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended August 10, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941-45.

TABLE 1.—Number of reported cases of 9 communicable diseases in the United States during the 4-week period July 14-August 10, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941-45

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	871	950	613	1,979	2,512	2,268	10,869	4,990	7,098
New England.....	47	19	17	2	1	3	1,762	522	1,047
Middle Atlantic.....	102	56	58	19	10	14	3,032	758	1,181
East North Central.....	111	105	86	56	69	73	2,439	1,005	1,246
West North Central.....	59	86	51	56	18	18	295	191	387
South Atlantic.....	153	211	136	728	564	564	1,045	129	528
East South Central.....	70	94	62	52	99	99	299	55	195
West South Central.....	135	210	132	961	1,574	842	664	332	341
Mountain.....	73	41	41	110	155	189	455	509	492
Pacific.....	121	128	77	17	22	83	885	1,489	1,489
	Meningococcus meningitis			Polioomyelitis			Scarlet fever		
United States.....	288	428	428	4,453	1,907	1,685	2,403	3,625	2,898
New England.....	10	24	28	58	146	82	224	261	274
Middle Atlantic.....	58	81	81	252	638	130	492	812	504
East North Central.....	44	81	81	747	210	153	578	850	779
West North Central.....	30	38	38	1,800	66	66	168	333	289
South Atlantic.....	29	52	52	183	247	247	236	356	313
East South Central.....	24	52	41	228	131	131	104	194	169
West South Central.....	40	46	38	462	272	90	125	181	135
Mountain.....	8	4	5	352	76	17	157	130	130
Pacific.....	45	50	50	333	121	106	317	506	422
	Smallpox			Typhoid and paratyphoid fever			Whooping cough <sup>3</sup>		
United States.....	11	11	21	558	625	680	9,375	11,802	13,684
New England.....	0	0	0	29	13	24	919	1,058	1,058
Middle Atlantic.....	0	0	0	45	59	87	1,611	3,148	2,684
East North Central.....	3	3	5	53	48	96	3,728	2,294	4,185
West North Central.....	3	3	6	25	25	47	427	378	400
South Atlantic.....	6	0	0	309	140	286	1,356	1,908	2,255
East South Central.....	0	1	1	61	100	154	711	484	519
West South Central.....	4	2	2	338	186	171	863	953	928
Mountain.....	1	1	2	37	26	85	267	355	374
Pacific.....	9	1	1	33	28	28	588	1,000	1,000

<sup>1</sup> Mississippi and New York excluded; New York City included. <sup>2</sup> Mississippi excluded.



## DISEASES ABOVE MEDIAN PREVALENCE

*Poliomyelitis*.—The number of cases of poliomyelitis rose from 1,214 during the preceding 4 weeks to 4,453 during the 4 weeks ended August 10. For the country as a whole the number of cases was 2.3 times that for the corresponding period in 1945 and 2.6 times the 1941-45 median. While each section of the country except the South Atlantic reported some excess over the 5-year median, about 75 percent of the cases were reported from 15 States, viz., Minnesota 902, Illinois 356, California 265, Missouri 229, Kansas 225, Colorado 207, Texas, 190, New York 165, Michigan 140, Nebraska 138, Iowa 128, Ohio 120, South Dakota 109, Alabama 108, and Oklahoma 107. In Florida, where the current epidemic first made its appearance in April, the weekly incidence dropped from 34 cases during the week ended June 22 to 9 cases during the week ended August 10, while in Texas and Colorado, where the disease became epidemic a few weeks later, the number of cases still remained at an unusually high level during the 4 weeks under consideration. About the first of July an increase in cases was reported from Minnesota and Missouri and by the end of the current period practically every State in the North Central area had reported a relatively high incidence, the total for the entire section being approximately 1,900 cases as compared with a 5-year median of 66 cases. In some States only the normal seasonal increase has occurred and in many others the reports were not greatly above the usual expectancy. So far the North Atlantic sections have been little affected by the epidemic.

Table 2 shows the total reported cases in geographic areas since the beginning of the year and the incidence by weeks since the first of June, with corresponding data for the three preceding years. The year 1943 shows an epidemic increase of poliomyelitis in the West South Central, Mountain and Pacific sections, while in 1944 and 1945 the highest incidence was reported from the South Central and Atlantic Coast regions. While the current epidemic started in the South Atlantic section, the largest numbers of cases so far have been reported from States in the North Central sections. For the country as a whole more cases have been reported during the current outbreak than during any previous epidemic. Except for a few cities, no information is yet available as to the proportion of cases that are paralytic.

*Diphtheria*.—The number of cases of diphtheria (871) reported for the current 4 weeks was about 90 percent of the 1945 incidence for the corresponding 4-week period, but it was 1.4 times the 1941-45 median. In the West North Central, South Atlantic, and the East and West South Central sections the increases over the preceding 5-year medians were slight, but in other sections the increases ranged

from 1.3 times the median in the East North Central section to 2.8 in the New England section.

TABLE 2.—Number of cases of poliomyelitis reported in each geographic area during 1943, 1944, 1945 and 1946

Geographic area	Total Jan. 1- Aug. 10	Week ended—										
		June					July				Aug.	
		1	8	15	22	29	6	13	20	27	3	10
All regions:												
1946.....	7,040	144	161	185	204	273	309	428	670	913	1,286	1,584
1945.....	3,584	71	92	96	116	155	154	253	369	391	476	671
1944.....	5,051	46	41	111	126	222	290	462	563	738	932	1,015
1943.....	3,311	52	60	99	136	190	245	297	329	361	450	545
New England:												
1946.....	102	0	1	0	2	1	4	8	20	18	25	23
1945.....	206	0	2	3	3	3	11	8	26	34	33	53
1944.....	130	4	0	1	1	1	4	8	9	12	36	37
1943.....	120	1	3	3	3	0	1	6	3	11	32	36
Middle Atlantic:												
1946.....	342	5	9	9	12	19	14	22	40	46	66	100
1945.....	984	10	12	14	19	22	31	56	95	120	196	227
1944.....	1,674	11	4	4	12	33	62	125	216	304	413	449
1943.....	167	0	5	4	3	5	6	14	12	13	20	38
East North Central:												
1946.....	903	8	9	13	17	31	24	54	71	146	248	282
1945.....	344	2	3	5	13	10	10	17	19	27	51	113
1944.....	652	5	4	3	15	10	21	58	63	111	143	178
1943.....	229	0	3	2	1	1	8	4	12	21	46	79
West North Central:												
1946.....	2,014	6	13	9	13	30	45	98	213	328	556	703
1945.....	128	0	0	0	4	5	5	7	14	8	15	29
1944.....	191	1	0	2	5	7	9	8	25	22	28	54
1943.....	305	2	0	2	1	5	9	15	12	40	61	117
South Atlantic:												
1946.....	469	38	40	37	44	34	54	39	42	54	55	32
1945.....	497	19	10	16	13	27	23	42	65	55	46	78
1944.....	1,125	6	3	28	50	103	123	126	128	136	167	107
1943.....	95	6	0	2	2	2	1	6	9	7	5	8
East South Central:												
1946.....	431	32	19	35	22	19	40	26	59	52	36	91
1945.....	317	5	4	11	11	16	25	35	26	42	28	35
1944.....	584	5	9	10	22	34	37	91	90	101	84	67
1943.....	101	0	4	0	4	0	6	5	6	14	11	5
West South Central:												
1946.....	925	33	48	54	58	83	80	107	109	121	122	110
1945.....	691	26	45	39	42	59	30	56	78	58	58	78
1944.....	303	8	10	12	15	15	17	26	18	22	27	23
1943.....	1,124	8	11	35	51	107	137	148	148	141	122	119
Mountain:												
1946.....	494	10	6	12	15	31	29	39	75	76	100	101
1945.....	114	5	1	2	2	0	1	3	13	16	18	29
1944.....	62	0	1	3	3	1	6	2	1	4	4	9
1943.....	158	2	4	3	8	10	2	9	11	4	29	28
Pacific:												
1946.....	477	12	16	16	21	25	19	35	41	72	78	142
1945.....	300	4	15	6	9	13	18	29	30	31	31	29
1944.....	330	6	10	9	3	18	11	18	18	26	30	31
1943.....	1,012	33	30	48	58	60	75	90	116	110	124	120

The current period is the first in the past twenty-four 4-week periods in which the current incidence was less than for its corresponding period of the preceding year. Prior to that time (approximately November 1, 1944) the incidence for the given 4-week period was usually less than for its corresponding 4-week period of the preceding year. It is too soon, however, to say whether the small drop

for the current period represents any real turning point in the recent upward trend of diphtheria.

*Measles.*—The number of cases of measles dropped from approximately 40,000 during the preceding 4 weeks to 10,869 during the 4 weeks ended August 10. The number was, however, 2.2 times the 1945 incidence during the same weeks and 1.5 times the 1941–45 median. Each section of the country except the West North Central, Mountain, and Pacific contributed to the relatively high incidence of this disease, but the North Atlantic and East North Central sections reported the largest numbers of cases. For the country as a whole the current incidence was the highest since 1943 when approximately 12,000 cases were reported for these same weeks.

#### DISEASES BELOW MEDIAN PREVALENCE

*Influenza.*—For the 4 weeks ended August 10 there were 1,979 cases of influenza reported, as compared with 2,512 for the corresponding period in 1945 and a 1941–45 median of 2,268 cases. The incidence was slightly above the normal seasonal level in the South Atlantic and West South Central sections, but in other sections the number of cases either closely approximated the preceding 5-year median or fell considerably below it.

*Meningococcus meningitis.*—The number of cases (288) of meningococcus meningitis reported for the current 4-week period was less than 70 percent of the 1941–45 median for the same weeks, which was represented by the 1945 figure (428 cases). The incidence was about normal in the West South Central, Mountain, and Pacific sections, but in all other sections the incidence was relatively low. For the country as a whole the current incidence was the lowest since 1942 when 211 cases were reported for the corresponding 4 weeks.

*Scarlet fever.*—For scarlet fever the current incidence was the lowest reported during this period since 1941 when 2,714 cases were reported for the same weeks. The number of cases (2,403) was less than 70 percent of the 1945 figure and 85 percent of the 1941–45 median. In the Mountain section the number of cases was higher than the 1941–45 median, but in all other sections the incidence was considerably below the seasonal expectancy.

*Smallpox.*—The number of cases of smallpox (11) stood at the 1945 level, but it was only about 50 percent of the preceding 5-year median. During 1945 and 1946 the incidence of this disease has been the lowest on record.

*Typhoid and paratyphoid fever.*—The incidence of this disease was also relatively low, the number of cases (558) being about 90 percent of the number reported in 1945 and 60 percent of the preceding 5-year median. In the New England, Mountain, and Pacific sections the

incidence was about normal, but in all other sections the numbers of cases were considerably below the normal seasonal median.

*Whooping cough.*—The number of cases (9,375) of whooping cough was the lowest reported for this period in the 9 years for which these data are available. For the country as a whole the current incidence was less than 70 percent of the 1941–45 median; the situation was favorable in all sections of the country except the East South Central where the number of cases was slightly higher than the median.

#### MORTALITY, ALL CAUSES

For the 4 weeks ended August 10 there were 32,201 deaths from all causes reported to the Bureau of the Census by 93 large cities. The preceding 3-year average for the corresponding weeks was 32,422 deaths. The number of deaths was higher than the preceding 3-year average in each of the first 2 weeks of the 4-week period but during the third and fourth weeks the numbers were 2.5 percent less than the averages.

### DEATHS DURING WEEK ENDED AUGUST 10, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 10, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	7,866	7,619
Average for 3 prior years.....	8,064	
Total deaths, first 32 weeks of year.....	297,437	292,237
Deaths under 1 year of age.....	663	576
Average for 3 prior years.....	598	
Deaths under 1 year of age, first 32 weeks of year.....	20,102	19,422
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67,249,618	67,375,499
Number of death claims.....	10,499	11,988
Death claims per 1,000 policies in force, annual rate.....	8.1	9.3
Death claims per 1,000 policies first 32 weeks of year, annual rate.....	9.9	10.6

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED AUGUST 17, 1946

#### Summary

A total of 1,815 cases of poliomyelitis was reported for the current week, as compared with 1,579 last week, 1,254 for the corresponding week in 1944, and a 5-year (1941-45) median of 694. Slight net decreases were recorded in the Middle Atlantic, West North Central, and East South Central areas. Of 40 States reporting 5 or more cases, 12 showed a combined decline of 123 cases. The 28 States reporting currently more than 14 cases are as follows (last week's figures in parentheses): *Increases*—New Hampshire 16 (8), New Jersey 19 (18), Pennsylvania 19 (12), Ohio 48 (25), Illinois 204 (131), Wisconsin 48 (31), Minnesota 366 (360), Missouri 105 (80), North Dakota 48 (24), Florida 18 (9), Mississippi 31 (22), Arkansas 23 (17), Louisiana 22 (17), Texas 49 (34), Colorado 82 (53), New Mexico 16 (9), Arizona 16 (5), Washington 27 (17), California 152 (115); *decreases*—New York 57 (70), Indiana 18 (21), Michigan 70 (74), Iowa 40 (48), South Dakota 28 (70), Nebraska 36 (45), Kansas 73 (74), Alabama 23 (44), Oklahoma 35 (40).

The total for the year to date is 8,842, as compared with 6,262 for the corresponding period in 1944, and a 5-year median of 4,058. Four times in the past 19 years the peak of weekly incidence of the disease was reached in the last week of August, 12 times between September 3 and September 24, twice (1930 and 1936) later than September 24 and once (1934) in the week ended June 23.

A total of 206 cases of diphtheria was reported currently, as compared with 234 last week, 214 for the corresponding week last year, and a 5-year median of 203. The cumulative figure is 9,902, as compared with 8,292 for the same period last year and a 5-year median of 7,426.

Of the total of 28 new cases of Rocky Mountain spotted fever reported (as compared with 29 last week), 5 occurred in Virginia and 4 in Maryland. The total to date is 416, as compared with 348 last year and a 5-year median of 365.

Deaths recorded for the week in 93 large cities of the United States totaled 7,673, as compared with 7,866 last week, 7,642 and 8,641, respectively, in the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,023. The total for the year to date is 305,057, as compared with 299,879 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Aug. 17, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Aug. 17, 1946	Aug. 18, 1945		Aug. 17, 1946	Aug. 18, 1945		Aug. 17, 1946	Aug. 18, 1945		Aug. 17, 1946	Aug. 18, 1945	
NEW ENGLAND												
Maine.....	8	0	0	-----	-----	-----	7	1	24	0	0	0
New Hampshire.....	0	0	0	-----	-----	-----	21	-----	-----	1	1	1
Vermont.....	0	0	0	-----	-----	-----	25	2	11	0	0	0
Massachusetts.....	2	1	1	-----	-----	-----	106	45	55	2	10	2
Rhode Island.....	0	0	0	-----	1	-----	6	-----	4	0	0	0
Connecticut.....	1	0	0	1	-----	-----	15	2	10	1	0	0
MIDDLE ATLANTIC												
New York.....	14	4	5	14	(1)	12	114	21	67	6	11	11
New Jersey.....	5	2	2	1	-----	1	60	9	36	1	2	2
Pennsylvania.....	3	3	3	1	1	-----	72	38	35	2	3	3
EAST NORTH CENTRAL												
Ohio.....	3	5	5	-----	1	2	161	14	16	5	3	3
Indiana.....	2	2	3	-----	3	3	-----	5	5	0	1	1
Illinois.....	4	5	7	1	-----	1	28	59	27	1	7	7
Michigan <sup>1</sup> .....	0	5	4	-----	1	1	25	36	37	1	4	4
Wisconsin.....	0	2	2	10	8	11	71	35	101	7	3	3
WEST NORTH CENTRAL												
Minnesota.....	1	4	4	-----	-----	-----	12	2	2	1	3	0
Iowa.....	0	0	1	-----	-----	-----	7	3	3	0	1	1
Missouri.....	8	1	1	1	-----	-----	3	6	17	0	1	1
North Dakota.....	5	6	0	-----	3	3	3	-----	7	0	0	0
South Dakota.....	1	4	0	-----	-----	-----	2	2	2	0	1	0
Nebraska.....	1	0	0	-----	-----	1	4	1	4	0	0	0
Kansas.....	10	6	2	3	-----	-----	6	7	7	1	0	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	-----	-----	-----	-----	-----	-----	0	0	0
Maryland <sup>1</sup> .....	6	8	4	-----	1	1	21	3	9	1	2	3
District of Columbia.....	0	0	0	-----	-----	-----	4	-----	4	3	1	1
Virginia.....	5	5	5	117	54	43	22	6	13	3	3	3
West Virginia.....	3	2	2	1	1	1	-----	4	4	0	0	0
North Carolina.....	14	16	13	-----	-----	-----	7	2	8	1	2	2
South Carolina.....	3	20	14	138	101	102	5	1	5	0	0	0
Georgia.....	3	11	11	7	7	7	7	2	3	1	1	1
Florida.....	7	3	2	3	1	2	4	-----	3	2	2	3
EAST SOUTH CENTRAL												
Kentucky.....	2	5	3	-----	-----	-----	1	9	9	1	2	1
Tennessee.....	2	11	5	3	3	3	9	1	7	1	5	2
Alabama.....	7	2	9	18	35	11	5	-----	7	1	1	1
Mississippi <sup>1</sup> .....	4	13	8	-----	-----	-----	-----	-----	-----	0	1	1
WEST SOUTH CENTRAL												
Arkansas.....	9	4	4	-----	13	5	8	-----	2	3	1	1
Louisiana.....	3	2	7	3	3	4	1	3	3	1	2	2
Oklahoma.....	4	1	1	7	17	15	3	6	2	2	1	0
Texas.....	16	33	25	264	221	221	64	31	43	2	2	2
MOUNTAIN												
Montana.....	1	0	1	3	-----	-----	32	3	5	0	0	0
Idaho.....	0	1	0	-----	3	-----	4	19	7	0	0	0
Wyoming.....	0	0	0	-----	-----	-----	4	3	5	0	0	0
Colorado.....	4	3	3	2	4	11	13	2	8	1	1	1
New Mexico.....	3	2	1	1	-----	-----	6	-----	-----	0	0	0
Arizona.....	4	3	2	15	12	20	6	2	12	0	0	0
Utah <sup>1</sup> .....	0	0	0	-----	-----	-----	9	25	23	0	0	0
Nevada.....	0	0	0	-----	-----	-----	-----	-----	-----	0	0	0
PACIFIC												
Washington.....	16	1	1	-----	-----	-----	0	37	19	0	2	2
Oregon.....	1	7	1	5	-----	1	12	13	12	0	1	2
California.....	21	11	10	3	9	15	83	189	126	7	6	8
Total.....	206	214	203	606	503	506	1,021	644	804	59	78	78
33 weeks.....	9,902	8,293	7,426	191,822	70,733	81,667	638,642	161,347	837,131	4,457	6,178	6,176

New York City only.

\* Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Aug. 17, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Aug. 17, 1946	Aug. 18, 1945		Aug. 17, 1946	Aug. 18, 1945		Aug. 17, 1946	Aug. 18, 1945		Aug. 17, 1946	Aug. 18, 1945	
NEW ENGLAND												
Maine.....	3	0	0	6	8	2	0	0	0	1	0	0
New Hampshire.....	16	1	1	2	2	2	0	0	0	0	1	0
Vermont.....	3	2	2	0	0	0	0	0	0	0	0	0
Massachusetts.....	14	22	11	26	28	46	0	0	0	3	2	6
Rhode Island.....	7	0	0	2	1	1	0	0	0	1	0	0
Connecticut.....	4	13	13	4	3	3	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York.....	57	110	49	59	80	58	0	0	0	8	4	12
New Jersey.....	19	72	17	17	14	14	0	0	0	5	7	6
Pennsylvania.....	19	50	45	25	30	38	0	0	0	7	5	8
EAST NORTH CENTRAL												
Ohio.....	48	15	15	64	52	44	2	0	0	6	7	8
Indiana.....	18	16	5	17	8	8	0	0	0	4	1	2
Illinois.....	204	77	34	22	26	31	0	0	0	4	1	4
Michigan <sup>2</sup> .....	70	10	12	22	40	32	0	0	0	7	1	4
Wisconsin.....	48	3	3	26	32	32	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	356	9	14	9	11	11	0	0	0	0	0	0
Iowa.....	40	7	7	6	15	9	0	0	0	1	0	1
Missouri.....	105	10	8	3	12	8	0	0	0	1	1	5
North Dakota.....	48	2	1	1	2	2	0	0	0	0	0	0
South Dakota.....	28	0	0	1	4	2	0	0	0	3	0	0
Nebraska.....	36	4	4	5	5	2	0	0	0	1	0	0
Kansas.....	73	1	3	7	19	19	0	0	0	4	3	3
SOUTH ATLANTIC												
Delaware.....	0	2	2	2	1	0	0	0	0	2	1	0
Maryland <sup>1</sup> .....	6	8	8	2	13	8	0	0	0	3	1	1
District of Columbia.....	2	12	8	4	3	4	0	0	0	1	0	0
Virginia.....	9	25	7	18	14	13	0	0	0	3	6	8
West Virginia.....	9	6	5	16	17	18	0	0	0	4	3	3
North Carolina.....	6	6	8	14	26	26	0	0	0	0	3	3
South Carolina.....	1	11	1	3	5	5	0	0	0	2	4	7
Georgia.....	4	3	3	14	18	6	0	0	0	2	6	11
Florida.....	18	3	3	4	2	2	0	0	0	2	1	4
EAST SOUTH CENTRAL												
Kentucky.....	6	3	15	3	8	7	0	0	0	3	2	17
Tennessee.....	10	36	5	12	8	8	0	0	0	5	4	6
Alabama.....	23	7	7	7	10	10	0	0	0	3	2	2
Mississippi <sup>2</sup> .....	31	3	3	9	7	8	0	0	0	3	2	6
WEST SOUTH CENTRAL												
Arkansas.....	23	0	4	0	4	5	0	0	0	3	4	8
Louisiana.....	22	6	4	2	7	2	0	0	0	7	6	8
Oklahoma.....	35	18	6	4	7	3	0	0	0	3	3	3
Texas.....	49	55	4	16	31	22	0	0	0	20	10	18
MOUNTAIN												
Montana.....	7	0	0	4	2	4	0	0	0	2	0	0
Idaho.....	3	1	0	1	2	3	1	0	0	2	2	0
Wyoming.....	11	0	0	0	4	2	0	0	0	0	0	0
Colorado.....	82	7	2	13	8	8	0	0	0	1	1	2
New Mexico.....	16	0	0	0	6	2	0	0	0	2	1	1
Arizona.....	16	0	0	1	2	2	0	0	0	1	2	2
Utah <sup>1</sup> .....	9	8	2	5	2	2	0	0	0	0	1	0
Nevada.....	0	1	0	1	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	37	23	12	9	10	16	0	0	0	1	2	2
Oregon.....	12	2	3	6	4	4	0	0	0	5	0	2
California.....	152	25	16	50	108	52	0	0	0	4	8	8
Total.....	1,815	604	604	544	730	650	3	0	2	140	100	196
23 weeks.....	28,843	4,308	4,058	56,839	134,548	97,729	278	265	600	2,519	2,724	2,296

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately as follows: Massachusetts, 3 (salmonella); Rhode Island 1; New York 1; New Jersey 3; Ohio 3; Illinois 1; Florida 1; Arkansas 1; Louisiana 1; Texas 1; Colorado 1; Arizona 1.

<sup>3</sup> Connected reports: Polio-myelitis—Massachusetts, week ended March 2, 0 cases; Maine, week ended July 27, 0 cases; New Mexico, 11 cases; Arkansas, week ended March 20, 0 cases; week ended June 15, 1 case, week ended August 3, 30 cases.

Telegraphic morbidity reports from State health officers for the week ended Aug. 17, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Aug. 17, 1946							
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever— endemic	Undulant fever
	Aug. 17, 1946	Aug. 18, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	9	24	18								
New Hampshire.....	7										
Vermont.....	7		12								2
Massachusetts.....	101	94	94								1
Rhode Island.....	21	7	12								
Connecticut.....	35	24	24								5
MIDDLE ATLANTIC											
New York.....	146	269	241	2	7		1	1		1	8
New Jersey.....	135	155	132	4		1		1			
Pennsylvania.....	126	156	178	1				3		1	2
EAST NORTH CENTRAL											
Ohio.....	178	149	158								1
Indiana.....	31	18	18								9
Illinois.....	181	97	181		1			3			7
Michigan <sup>1</sup> .....	184	53	242	1							
Wisconsin.....	216	73	214				1				5
WEST NORTH CENTRAL											
Minnesota.....	15	2	50	3							
Iowa.....	26	9	26	1							
Missouri.....	18	33	33			5	1				2
North Dakota.....		2	9				1				
South Dakota.....	1	2	4								2
Nebraska.....	3		6								
Kansas.....	29	19	24				2				1
SOUTH ATLANTIC											
Delaware.....	3	5	4					1			
Maryland <sup>1</sup> .....	18	41	56			2	1	4			2
District of Columbia.....	9	8	9								
Virginia.....	63	39	39	1		132		5			
West Virginia.....	41	8	27								1
North Carolina.....	91	93	107					3	2	1	
South Carolina.....	50	55	74		19				1	1	
Georgia.....	3	14	13	1				3		14	3
Florida.....	22		3				1			8	
EAST SOUTH CENTRAL											
Kentucky.....	24	29	42		5						
Tennessee.....	35	38	38		3			2	2		2
Alabama.....	7	14	14					1		10	5
Mississippi <sup>1</sup> .....										5	
WEST SOUTH CENTRAL											
Arkansas.....	10	8	22	3	1				6		1
Louisiana.....	2	5	6								1
Oklahoma.....	3	15	15			1	1	1		24	
Texas.....	139	122	126	23	197	20	2		2	42	15
MOUNTAIN											
Montana.....	1		22				1				
Idaho.....	7	7	4			2			1		1
Wyoming.....	4	3	3	1					1		
Colorado.....	22	39	39				2				1
New Mexico.....	6	6	6	1	2	2					1
Arizona.....	4	1	9			36					
Utah <sup>1</sup> .....	11	18	30		1				2		1
Nevada.....							1				
PACIFIC											
Washington.....	16	22	24				3				2
Oregon.....	21	13	22								2
California.....	48	248	170	8	11		8			1	1
Total.....	2,129	2,045	3,052	50	247	201	26	28	17	108	85
Same week, 1945.....	2,045			25	387	462	19	19	11	176	81
Average, 1943-45.....	2,311			38	502	368	20	18	9	166	
23 weeks, 1945.....	64,543			1,832	11,289	4,536	237	416	329	2,086	3,225
23 weeks, 1946.....	84,194			1,183	15,995	6,135	279	343	519	2,977	3,110
Average, 1943-45.....	93,067		123,382	1,215	13,415	5,315	360	265	496	2,339	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

<sup>3</sup> Includes delayed reports, Virginia, 6 cases.

<sup>4</sup> Delayed reports, Virginia, deducts 6 cases from cumulative total.

Leprosy: Louisiana 1 case.



## WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 10, 1946

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Enecephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyositis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0		0		0	2	1	1	0	0	
New Hampshire:												
Concord.....	0	0		0		0	1	0	0	0	0	
Massachusetts:												
Boston.....	6	0		1	20	1	5	3	8	0	3	22
Fall River.....	0	0		0	1	0	0	0	0	0	0	4
Springfield.....	0	0		0	9	0	0	0	1	0	0	4
Worcester.....	0	0		0	10	0	2	2	0	0	0	26
Rhode Island:												
Providence.....	0	0		0	7	0	2	1	2	0	0	22
Connecticut:												
Bridgeport.....	0	0		0	1	0	1	0	0	0	0	1
Hartford.....	0	0		0	1	0	0	0	0	0	1	3
New Haven.....	0	0		0	2	0	0	0	0	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo.....	3	0		0		0	10	1	0	0	0	6
New York.....	11	1		0	33	3	43	40	18	0	3	45
Rochester.....	0	0		0		0	1	3	2	0	0	1
Syracuse.....	0	0		0		0	1	1	0	0	0	
New Jersey:												
Camden.....	1	0		0	1	0	1	0	0	0	0	
Newark.....	0	0		0	6	0	4	2	2	0	1	35
Trenton.....	0	0		0		0	2	0	1	0	0	9
Pennsylvania:												
Philadelphia.....	4	0	1	0	6	0	5	3	3	0	2	22
Pittsburgh.....	1	0	1	1	1	0	1	4	3	0	0	12
Reading.....	1	0		0		0	1	0	1	0	0	5
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0		0	2	0	2	5	7	0	0	6
Cleveland.....	0	0		0	57	1	4	20	6	0	0	11
Columbus.....	0	1		0	5	0	2	0	1	0	0	8
Indiana:												
Fort Wayne.....	0	0		0		0	1	1	0	0	0	5
Indianapolis.....	1	0		0	1	0	4	3	2	0	0	4
South Bend.....	0	0		0		0	0	1	0	0	0	
Terre Haute.....	0	0		0		0	1	0	0	0	1	
Illinois:												
Chicago.....	0	0	2	0	8	0	10	40	12	0	1	90
Springfield.....	0	0		0		0	0	0	0	0	0	
Michigan:												
Detroit.....	3	1		0	3	0	7	32	9	0	1	63
Flint.....	0	0		0		0	2	1	1	0	0	1
Grand Rapids.....	0	0		0	2	0	1	3	1	0	0	13
Wisconsin:												
Kenosha.....	0	0		0		0	0	10	1	0	0	2
Milwaukee.....	0	0		0	7	0	1	5	3	0	0	30
Racine.....	0	0		0	9	0	0	1	0	0	0	2
Superior.....	0	0		0	1	0	1	9	0	0	0	17
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0		0		1	0	7	0	0	0	2
Minneapolis.....	0	0		0	5	0	5	125	2	0	0	
St. Paul.....	1	0		0		1	1	31	1	0	0	7
Missouri:												
Kansas City.....	0	0		0	2	0	3	19	1	0	1	10
St. Joseph.....	0	0		0		0	0	0	0	0	0	
St. Louis.....	2	0		0	5	1	6	23	0	0	1	

## City reports for week ended Aug. 10, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	—	0	—	0	1	7	0	0	0	—
Nebraska:												
Omaha.....	0	0	—	0	2	1	0	18	2	0	0	1
Kansas:												
Topeka.....	1	0	—	0	—	0	0	1	0	0	0	12
Wichita.....	0	1	—	0	—	0	1	3	0	0	0	—
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	—	0	—	0	1	0	1	0	0	—
Maryland:												
Baltimore.....	3	0	—	0	20	1	7	0	2	0	0	27
Cumberland.....	0	0	—	0	—	0	0	0	0	0	0	—
Frederick.....	0	0	—	0	—	0	0	0	0	0	0	—
District of Columbia:												
Washington.....	0	0	—	0	4	2	1	0	3	0	0	3
Virginia:												
Lynchburg.....	0	0	—	0	2	0	0	0	1	0	0	—
Richmond.....	0	0	—	0	7	0	2	3	1	0	1	10
Roanoke.....	0	0	—	0	—	0	0	0	2	0	0	—
West Virginia:												
Wheeling.....	0	0	—	0	—	0	0	0	0	0	0	6
North Carolina:												
Raleigh.....	0	0	—	0	—	0	3	0	0	0	0	8
Wilmington.....	1	0	—	0	1	0	0	1	0	0	0	1
South Carolina:												
Charleston.....	0	0	3	0	3	0	0	0	0	0	0	—
Georgia:												
Atlanta.....	1	0	—	0	—	0	1	0	2	0	0	—
Brunswick.....	0	0	—	0	—	0	0	0	0	0	0	—
Savannah.....	0	0	—	0	3	0	0	0	0	0	0	—
Florida:												
Tampa.....	3	0	—	0	3	0	1	0	0	0	0	3
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	—	0	4	0	7	6	2	0	0	9
Nashville.....	0	0	—	0	—	0	0	1	0	0	0	3
Alabama:												
Birmingham.....	1	0	—	0	1	0	2	*25	0	0	0	—
Mobile.....	1	0	1	0	—	0	1	2	0	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	—	0	—	0	5	2	0	0	0	1
Louisiana:												
New Orleans.....	0	0	—	0	3	0	7	10	0	0	0	4
Shreveport.....	0	0	—	2	—	0	4	3	0	0	0	—
Texas:												
Dallas.....	1	0	—	0	—	0	3	3	3	0	0	—
Galveston.....	0	0	—	0	—	0	3	1	0	0	0	—
Houston.....	0	0	—	0	1	0	5	2	0	0	0	2
San Antonio.....	0	0	2	0	—	0	0	3	2	0	0	—
MOUNTAIN												
Montana:												
Billings.....	0	0	—	0	3	0	2	1	0	0	0	1
Great Falls.....	0	0	—	0	2	0	1	1	0	0	0	—
Helena.....	0	0	—	0	—	0	0	0	0	0	0	—
Missoula.....	0	0	—	0	—	0	1	1	0	0	0	—
Idaho:												
Boise.....	0	0	—	0	—	0	0	0	0	0	0	—
Colorado:												
Denver.....	7	0	1	0	9	0	3	12	0	0	0	3
Pueblo.....	0	0	—	0	2	0	1	5	1	0	0	—
Utah:												
Salt Lake City.....	1	0	—	0	3	0	2	2	2	0	0	—

\*Delayed reports; not included in computing rates.

## City reports for week ended Aug. 10, 1946—Continued

	Diphtheria cases	Etiophthalmia, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	3	0	2	4	1	0	0	20
Spokane.....	0	0	-----	0	-----	0	2	6	1	0	0	4
Tacoma.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
California:												
Los Angeles.....	0	0	1	0	29	1	4	52	10	0	0	10
Sacramento.....	0	0	0	0	-----	0	1	1	2	0	0	1
San Francisco.....	0	0	-----	1	1	0	1	3	4	0	2	-----
Total.....	55	4	12	5	310	13	208	551	143	0	18	684
Corresponding week, 1945.....	45	-----	13	3	323	-----	192	-----	243	0	22	937
Average, 1941-45.....	40	-----	21	15	323	-----	1225	-----	196	0	31	1,016

1 3-year average, 1943-45.

2 5-year median, 1941-45.

Dysentery, amebic.—Cases: New York 7; Chicago 2; St. Louis 1; Memphis 1; Los Angeles 2.

Dysentery, bacillary.—Cases: New York 1; Chicago 2; St. Louis 1; Charleston, S. C., 6; Memphis 1; Salt Lake City 1; Los Angeles 6.

Dysentery, unspecified.—Cases: Baltimore 1; San Antonio 1.

Typhemia.—Cases: Memphis 1.

Typhus fever, endemic.—Cases: Atlanta 1; Tampa 4; New Orleans 6; Houston 1; San Antonio 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 34,240,900)

	Diphtheria case rates	Etiophthalmia, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	15.8	0.0	0.0	2.6	134	2.6	34.1	18.4	32	0.0	10.5	221
Middle Atlantic.....	9.7	0.5	0.9	0.5	22	1.4	31.9	25.0	14	0.0	2.8	63
East North Central.....	2.4	1.2	1.2	0.0	58	0.6	21.9	79.7	26	0.0	1.8	192
West North Central.....	8.0	2.0	0.0	0.0	28	3.0	33.8	465.5	12	0.0	4.0	66
South Atlantic.....	13.7	0.0	5.1	0.0	74	5.1	27.4	6.8	21	0.0	1.7	99
East South Central.....	17.7	0.0	5.9	0.0	30	0.0	59.0	77.1	13	0.0	0.0	71
West South Central.....	2.9	0.0	5.7	5.7	11	0.0	77.5	68.9	14	0.0	0.0	17
Mountain.....	63.5	0.0	7.9	0.0	143	0.0	79.4	174.7	119	0.0	0.0	32
Pacific.....	0.0	0.0	1.6	1.6	52	1.6	15.8	104.4	23	0.0	3.2	55
Total.....	8.4	0.6	1.8	0.8	47	2.0	31.8	84.8	22	0.0	2.7	104

## PLAGUE INFECTION IN KERN COUNTY, CALIF.

Under date of August 14, 1946, plague infection was reported proved, on August 13, in a pool of 200 fleas and 98 lice from 25 ground squirrels, *C. beecheyi*, and another pool of 200 fleas and 191 lice from 15 ground squirrels, same species, taken, respectively, 9 miles and 6 miles west of Cummings Valley School.

# FOREIGN REPORTS

## CANADA

*Provinces—Communicable diseases—Weeks ended July 20, and July 27, 1946.*—During the weeks ended July 20, and July 27, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

### *Week ended July 20, 1946*

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		9		67	198	19	27	37	27	384
Diphtheria.....		4		19	1	1				25
Dysentery, amebic.....								2		2
Encephalitis, infectious.....							1			1
German measles.....				4	10	4		5	3	26
Measles.....		2	3	84	200	88	44	148	13	582
Meningitis, meningococcus.....		1						1		2
Mumps.....		2		2	127	22	40	15	54	262
Polioomyelitis.....			1	2	5					8
Scarlet fever.....		3	3	46	17	6		5	7	87
Tuberculosis (all forms).....		7	12	149	47	28	5	21	34	303
Typhoid and paratyphoid fever.....		3	2	9	1		2	1	9	27
Undulant fever.....				1						1
Veneral diseases:										
Gonorrhea.....	8	17	14	81	145	44	48	61	79	497
Syphilis.....	2	26	18	60	85	11	14	13	21	290
Whooping cough.....				20	44	1		4	2	71

### *Week ended July 27, 1946*

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		28		7	142	19	27	36	34	293
Diphtheria.....		7		19	14	4	2			46
Dysentery, bacillary.....				4						4
German measles.....				1	17		1	3	9	31
Influenza.....		6			4					12
Measles.....		21	1	18	254	62	29	115	25	525
Meningitis, meningococcus.....		2	1	1	1				1	6
Mumps.....		1	1	1	135	12	48	25	34	256
Polioomyelitis.....	5		2	21	15			2		46
Scarlet fever.....	6	10	2	8	27	7		6	2	68
Tuberculosis (all forms).....		24	3	28	73	15	17		43	203
Typhoid and paratyphoid fever.....				6	1			1	4	12
Undulant fever.....				1	2			1		4
Veneral diseases:										
Gonorrhea.....		17	16	50	189	52	64	42	74	454
Syphilis.....		9	3	88	90	11	11	7	25	294
Whooping cough.....		7	1	12	46			7	1	74

**REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND  
YELLOW FEVER RECEIVED DURING THE CURRENT WEEK**

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

**Plague**

*Belgian Congo*.—Under date of August 16, 1946, 4 fatal cases of pneumonic plague were reported at Regetsu Lubero, Costermansville Province, 1 case of bubonic plague was reported at Linga, and 1 case of septicemic plague each at Dendro and Yiru, Stanleyville Province, Belgian Congo.

**Typhus Fever**

*Morocco (French)*.—For the period July 21–31, 1946, 50 cases of typhus fever were reported in French Morocco, by regions as follows: Agadir and frontier districts, 21; Casablanca, 20; Fez, 5; Marrakech, 1; Meknes, 2; Rabat, 1.

**Yellow Fever**

*Colombia—Santander Department—La Girona—Lebrija*.—For the period June 10 to July 28, 1946, 1 death from yellow fever was reported in Lebrija, La Girona, Santander Department, Colombia.

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# FEDERAL SECURITY AGENCY

## United States Public Health Service

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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# Public Health Reports

**VOLUME 61 . SEPTEMBER 13, 1946 . NUMBER 37**

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Notifiable Diseases, Second Quarter 1946**





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# Public Health Reports

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## HEALTH CONDITIONS IN CERTAIN LARGE CITIES OF THE FAR EAST AFTER LIBERATION

By HENRY R. O'BRIEN, M. D.,<sup>1</sup> *Senior Surgeon (R), United States Public Health Service*

South of China is a group of small and medium-sized countries known as Southeast Asia. They occupy the peninsula of Indo-China and the islands of the sea stretching southward and eastward through New Guinea. Politically they comprise Burma, Siam, French Indo-China, the Philippines, Malaya, and the Netherlands East Indies. To them may be added the colony of Hongkong. Their population is 150,000,000, about that of Canada and the United States combined. They were overrun by the Japanese in 1941 and early 1942, and were not set free until 1945, under circumstances varying for each country. In connection with work with United Nations Relief and Rehabilitation Administration I visited the capital city of each of these countries within a few months after liberation. The health conditions I saw, with figures received from the authorities, form the subject of this article.

The countries and the cities are shown in figure 1, and some of the details are given in table 1.

While the pictures in the seven cities differed, they had many features in common. In each some experienced staff were brought back or were found locally; it was not necessary to build entirely from the beginning. Medical supplies were very short and equipment was wearing out, with no replacements. Transportation, both with other countries and with the interior, was badly crippled. Communications within and without the country were slow. Water systems were short of chlorine. Health staffs on prewar salaries found it hard

<sup>1</sup> The observations on which this paper is based were made while serving as Chief Medical Officer of the Philippine Mission and later as Chief Medical Officer for Displaced Persons in the Far East, United Nations Relief and Rehabilitation Administration.

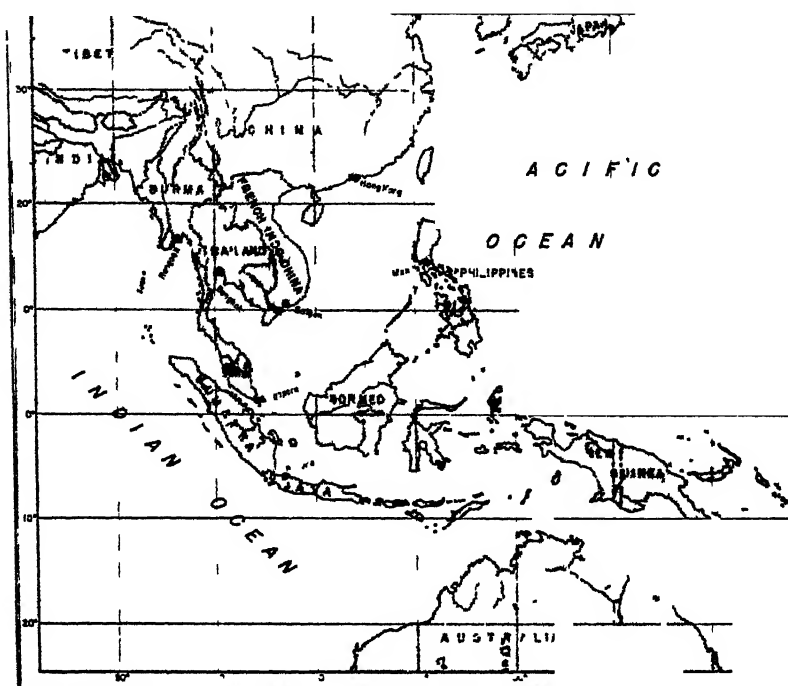


FIGURE 1.—Map of Southeast Asia and adjacent countries.

TABLE 1.—Major cities visited in southeast Asia

City	Prewar population (estimated)	Date of liberation	Date of author's visit	Health authority
Manila.....	600,000	February 1945	August-November 1945	Dr. M. Icasiano.
Rangoon.....	400,000	May.....	January.....	Lt. Col. B. P. Srivastava.
Singapore.....	700,000	September, first week.	January and February.	Col. W. J. Vickers.
Bangkok.....	800,000	September.....	do.....	Dr. S. Daengsawang.
Hongkong.....	1,000,000	September, first week.	November 1945, February 1946.	Col. J. P. Fehily.
Saigon.....	255,000	September, third week.	February.....	Dr. Herivaux.
Batavia.....	530,000	September, last week.	January.....	Dr. J. W. Wolf.

to meet the steadily rising cost of living. Food was high, new clothes almost prohibitive in price, and getting to the office was a major problem each day. Efficiency naturally suffered. Much of the population of this area was undernourished. People fled from a city, or crowded back into it, and population estimates were difficult. Among unsettled people, poorly housed and poorly clothed, epidemics spread. The incidence of venereal disease, untreated and little controlled, was high.

MANILA <sup>2</sup>

Manila had all of this and more. It was the first to see the flag of the Rising Sun go down, after a long and savage battle within the city itself, a struggle that fortunately was not repeated elsewhere among these cities. Much of Manila was destroyed, hospitals and homes alike. The Philippine General Hospital was shelled and looted; St. Luke's, San Lazaro, and the little North General were the only other hospitals left in the city proper. Outside, the 650-bed Quezon Tuberculosis Sanitarium was taken over by the United States Army. The municipal water supply did not reach much of the city south of the Pasig River until October. Three or four families found shelter in one house. The streets were slowly cleared of rubble, and corrugated iron shacks sprang up. People who had fled to the hills in the last months of Japanese rule came back, bringing malaria with them. In the city mosquitoes and the swarms of flies disappeared after DDT was sprayed from the air, but malaria and malaria deaths stayed on.

At occupation a Civil Affairs group took over from the Health Department of Manila. Together they attacked the problems of the early days. Responsibility for the civil administration was turned back to the Commonwealth government in July 1945. Port quarantine remained in the hands of the United States Army and the United States Public Health Service.

Manila's main health problems are seen in table 2. Progress in solving them is shown in figure 2. With variations, the experience is typical of this group of cities after liberation. Deaths from starvation and from battle casualties, however, were high in Manila. There was a short influenza epidemic in March and April 1945. Diphtheria was endemic, but not serious. Measles appeared in August, but deaths did not mount until later. Deaths from starvation were high in the early days after liberation.

The Alabang Serum Laboratory, just outside Manila, did not suspend operations during the occupation, and was back in active production in March 1945. It had some reserve supplies, but was short of ampules, which the Army then flew in. It prepared vaccines against smallpox (both fresh virus and dried), rabies, tetanus, cholera, typhoid, and dysentery. One vaccine combined cholera, typhoid, and dysentery.

RANGOON <sup>3</sup>

Next to Manila, Rangoon suffered more destruction from war than any other major city in Southeast Asia. It was bombed by the Japanese in 1941 and 1942, and even more intensively by the Allies

<sup>2</sup> The city of Manila lies along Manila Bay, and is bisected by the Pasig River, a small tidal stream.

<sup>3</sup> The city lies on a plain, on one side of the deep and winding Rangoon River, which leads to the sea.



in 1945. It was fortunately spared a pitched battle within its limits, but when the Fourteenth Army entered early in May 1945 it found a sickening amount of destruction. The licentiate medical school, near the railway station, was a mass of rubble, and the out-patient building of the General Hospital across the street was badly damaged. The water supply had numerous breaks and leaks, and dacoits stole faucets from the hydrants, leaving the water running. Authorities did not consider the water supply safe.

The correlation of the Civil Affairs Section of the army with the civil government was close. Many civilian officials were brought in with the army, in uniform. Others were found and commissioned as the advance proceeded. Responsibility was turned over to the civil administration on January 1, 1946, the same people continuing in the same positions. In Rangoon the debris from bombing was largely cleared up. With new truck chassis brought in by the army and bodies made locally, collection of refuse and of some night soil was set up again. The Port Health Unit, under Dr. J. A. Anklesaria, was revived, separate from the Corporation Department of Health.

Smallpox was endemic from May 1945 on, up to 8 cases being reported weekly. Mortality was about 50 percent of the reported cases. A few cases of bubonic plague were scattered over the same period. There was some cholera, with a peak in June and reappearance in December. These and less important diseases such as chickenpox and mumps were cared for in a neat isolation hospital of one-story pavilions. The three "quarantine" diseases caused only 109 (1.2 percent) of the 8,956 deaths reported from all causes from May to December. Table 2 shows that other communicable diseases were more important numerically. The time distribution and the relative importance of the main groups is shown in figure 3.

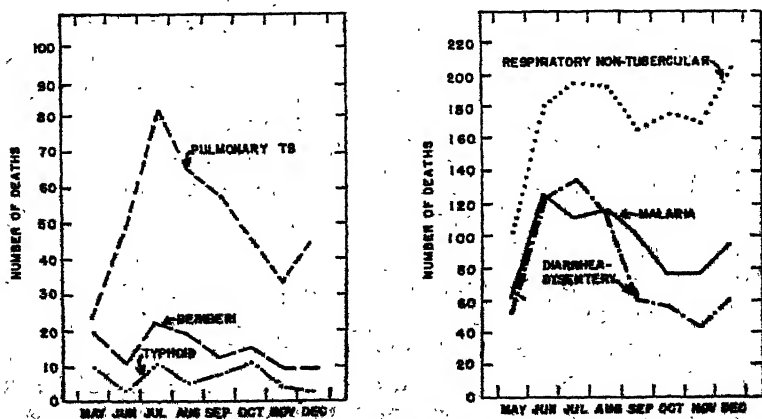


FIGURE 3.—Deaths from major preventable diseases in Rangoon in 1945, after liberation.

Since population estimates rose from 150,000 in May to 400,000 or 500,000 at the end of the year, no rates can be calculated. With population increasing so rapidly, there was a real drop in rates in the later months, which the chart does not show. Even at that, diarrhea and dysentery in Rangoon in the early months after liberation did not rise to the heights seen in Manila. Tuberculosis was less prominent here than in Manila or Singapore. The beriberi figures suggest that even in a large city malnutrition could not be so serious in a rice granary like Burma. Neither measles nor diphtheria was reported.

The excellent building of the degree-granting medical school was occupied by an army hospital, but plans for reopening the school were beginning to be made.

#### SINGAPORE

Aside from a few hulks sticking up in the harbor Singapore showed little damage after liberation. The British Military Administration took over the municipality the first week in September 1945, largely with returning administrators and the old local staff.

From past history it was expected that diseases of greatest importance would be malaria, dysentery, tuberculosis, and beriberi. The statistics for September to December 1945 show them closely associated as causes of death. Beriberi led for over a month; in the period from September 2 to October 6, 1945, it was the cause of 16.2 percent of all the deaths. It had long been known that under Japanese rule Malaya was short of food, and its leading city was naturally the chief sufferer. Australian milk, evaporated or dried, was rushed in and distributed to babies, mothers, and younger children through the 10 health centers of the city. Later imports of rice and flour helped the situation. For malaria, reliance was placed on giving quinine or atabrin to as many previously untreated patients as possible, to reduce the size of the carrier reservoir. To rehabilitate and enlarge the extensive system of drains will take 2 or 3 years. Against dysentery, efforts were made to bring in chlorine cylinders by air as rapidly as possible, to arrange sea shipments from India, and to get refuse collection going to diminish fly breeding. For tuberculosis, always high in the Orient, the main efforts were made to isolate advanced cases in institutions, to improve general nutrition, and to diminish overcrowding.

To prevent possible epidemics a house-to-house campaign vaccinated some 100,000 against smallpox and typhoid in the last 4 months of the year. Singapore was well vaccinated against smallpox before the war and the Japanese kept it up well, so that the city may escape the epidemics ranging almost everywhere to the north. There were no

---

<sup>1</sup> Later 2 cases of smallpox were reported from Singapore for the period of May 26-June 1, 1946.

diphtheria deaths in Singapore until early in January 1946, possibly reflecting the immunization efforts of the Japanese. From 1935 to 1938 diphtheria mortality ranged from 9.8 to 12.0 per 100,000.

As civilian shipping increased, the British Military Administration was planning to start up the quarantine station on St. John's Island.

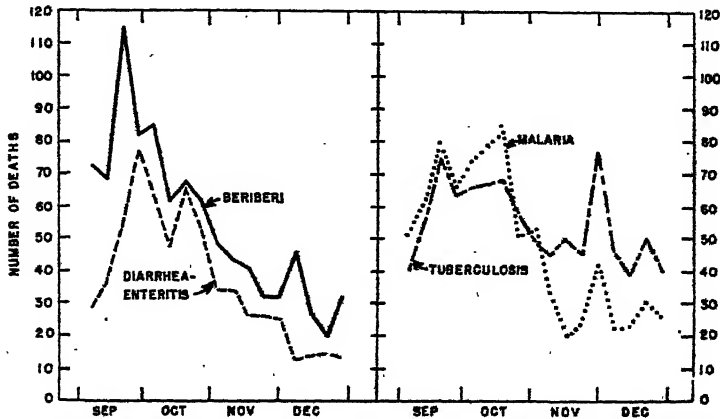


FIGURE 4.—Deaths from major preventable diseases in Singapore in 1945, after liberation.

TABLE 3.—Infant mortality in Singapore

Week ending—	Births	Infant mortality	
		Deaths	Rate
1945			
December 8	361	53	147
15	392	69	161
22	338	45	137
29	314	56	176
Total	1,405	223	159
1946			
January 5	345	54	156
12	458	47	108
19	381	42	110
26	349	42	123
Total	1,534	185	121
February 2	398	29	72
9	410	30	73
Total	708	78	110
Grand total	2,939	408	139

In January 1946 Lord Mountbatten's headquarters was anxious to have a health information service set up temporarily for the military theater they served. In June His Majesty's Commissioner for South-east Asia began to operate such a service. The King Edward VII Medical School made plans to reopen. The Japanese had used its plant for mass production of vaccines.

In February 1946 a small poliomyelitis epidemic was developing in Singapore. Following 22 cases in the British military services start-



ing in late November, civilian cases began to appear, the first in late December. The service cases had a high mortality, 36 percent. The civilian patients were almost all children under 5, and mortality was low. All were hospitalized.

Table 2 shows the deaths from certain causes in Singapore in 1945 after liberation. The initial rise and later fall in mortality are shown in figure 4. Pneumonia showed no special distribution.

The infant mortality in the period from December 2, 1945, to February 9, 1946, was 130. Its variation and decline are shown below. From 1935 to 1938 the annual rate in Singapore was between 172 and 191.

#### BANGKOK<sup>5</sup>

Bangkok was selectively bombed by the Allies to interrupt Japanese communications, but considerable damage was done to health facilities, too. The bridge over the Chao Phya River was cut, breaking the water main to Thonburi on the west bank and turning 125,000 people back to raw canal or river water. Pinpoint Allied bombing had wrecked two of the four engines at the power plant, and water pressure in the main part of the city, on the east bank, was very low, so that leaks and pollution were possible. There was great shortage of medical supplies and textiles.

But Siam had enough rice to eat and some to export, and in general Bangkok was in good condition. Almost all of her hospital space was available for civilian use, more than in Manila or Singapore for instance. Her health department under the Ministry of Public Health had not been disturbed by the Japanese, and was largely run by men trained in the United States. The Pasteur Institute of the Siamese Red Cross Society was making vaccines and antivenins. The list included smallpox, rabies, cholera, and plague vaccines; and diphtheria and tetanus antitoxins. The medical school was crowded with students; in spite of worn-out equipment and two bombed buildings it was in the best condition of any medical school east of Calcutta. The medical officers of Lord Mountbatten's command were interested in furnishing Siam with what supplies were available.

Bangkok needed all this, for she was beset with two major epidemics. Smallpox, which had devastated the eastern and northern provinces of Siam earlier in 1945, became serious in the capital in September 1945. On January 29, 1946, there were 274 cases in an old, entirely inadequate isolation hospital. An intelligent staff was using sulfadiazine on the confluent cases and believed they were cutting the mortality in this group from 75 percent to 25 percent. The hemorrhagic cases always died. The mortality for smallpox in Bangkok in

<sup>5</sup> The city lies in a tidal delta on both sides of a broad stream, the Menam Chao Phya.

1945 was 50 percent of the reported cases. A number of attacks occurred in people with vaccination scars, but in none with vaccination less than 1 year old.

Cholera, which had flourished in the dry season of early 1945 with a peak of 144 deaths in May, disappeared in the later months of the rains, only to reappear in the dry months of November and December and become serious in January. With water conditions as they were, inoculation and education had to be pushed. The combined situation strained the resources of the Pasteur Institute.

#### HONGKONG

The colony of Hongkong is made up of Victoria, on a rocky island off the south coast of China, and Kowloon, opposite on the mainland. Just before Pearl Harbor some 750,000 refugees crowded in to add to the normal population of a million. Food supply is naturally a major problem.

Hongkong suffered some damage during the war, but was reoccupied without a battle on September 1, 1945. A week's disorder with some looting of private homes preceded the arrival of troops. Order was promptly restored by Civil Affairs, who brought in food and supplies. Chinese returned in increasing numbers, by April 1946 at the rate of 60,000 a month, it is said.

The striking picture of the early days was the absence of dysentery or smallpox and the presence of a large amount of malaria. Deaths from malaria soon fell, doubtless due to more medicine and better treatment. Tuberculosis deaths, originally fewer than from malaria, slowly increased, probably reflecting the increase in population. In the 6 weeks from February 14 through March 23, 1946, deaths from tuberculosis were 10.4 percent, from all communicable disease 17.1 percent, of all deaths. Typhoid and diphtheria were endemic. In March cerebrospinal meningitis became mildly epidemic. Smallpox began to appear at the end of January with an occasional case, at first imported. Cholera appeared in the same fashion in March.

Plans were being discussed for the reopening of the medical school.

#### SAIGON

Saigon, with its Chinese area known as Cholon, lies on one bank of the Saigon River, which accommodates ocean-going vessels. Maj. Gen. L. F. Solier, Conseiller pour la Santé Publique for Indo-China, was my guide.

The arrival of Allied forces in Indo-China after VJ-day was delayed until the third week in September 1945, and the political situation there was at first unsettled. In November, Saigon was on short rations when the Annamites shut off the entry of any considerable

quantity of food into the city. The Chinese population suffered especially, particularly with dysentery and beriberi (adult and infantile). The sick were cared for in hospitals supported by benevolent merchants. Most of them were treated with time-honored Chinese herbs, but some 20 percent accepted the services of young Western-trained doctors, who had secured quinine, emetine, and thiamine from the French, British, or American forces.

In Saigon itself the Polyclinic was a group of modern buildings where some 1,700 Chinese and Annamites were treated in a morning, without charge. Malaria, dysentery, and beriberi were prominent. Tuberculosis cases were fluoroscoped and pneumothorax done. The drug room was short of quinine, sulfur ("90 percent have scabies"), vaseline, vitamins, cough mixtures, and neosalvarsan. There were no sulfa drugs or penicillin. Cotton goods and laboratory stains were short. In the dermatology building "much yaws" was reported.

Vaccines for Indo-China were being prepared in Saigon, since the area around Dalat was disturbed. The Pasteur Instituté, directed by Dr. J. Mesnard, was short of materials and bottles, but was actively preparing vaccines against smallpox, cholera, plague, rabies, typhoid, dysentery, and influenza. They were making both fresh and dried smallpox vaccine. One lot of the latter, the Institute said, after 6 months of room temperatures gave 98 percent takes; this is particularly important in tropical countries with remote provinces. For rabies both the fresh and phenol-preserved vaccines were made; quantities were limited by a shortage of rabbits. Oral types of dysentery vaccine were made for Flexner, Strong, Castellani, Saigon, Morgan, Hiss, and other strains, but for Shiga dysentery a serum from Paris was used.

The city water supply came from four sets of drilled wells, 40 to 50 meters deep, producing some 40,000 cubic meters daily. There was no filtration save for one set of wells, where the iron content called for aeration and rapid sand filtration. The troubles of 1940 led to the installation of an electrolytic process for chlorination. No residual chlorine was found in the taps at a distance, but bacteriological tests were satisfactory.

Smallpox started in Saigon the week ending February 13, 1946, with nine cases. There were none known in the country about the city, but the disease was present on the Siamese border.

#### BATAVIA<sup>6</sup>

The political situation in Java continued unsettled longer than elsewhere in Southeast Asia, and this was reflected in the confused public health situation in the capital city. The British and Dutch were in

<sup>6</sup> Located on the north coast of the crowded island of Java, a short distance from its port, Tanjung Priok.

charge of much of Batavia, while the Indonesians operated the General Hospital. They used supplies which they obtained on requisition from the Government of the Netherlands East Indies, the latter sharing what little they had been able to get in. The Netherlands East Indies Department of Health and Medical Service, under Dr. J. W. Wolff, knew what diseases were present in the city, but figures were naturally incomplete.

When Lord Mountbatten's forces entered the Indies, some 200,000 Dutch were in internment camps, mainly in Java. As quickly as possible, as many as could be accommodated were brought to Batavia, to go on by sea to Holland or to Ceylon, Malaya, or Siam. One of their Batavia camps was in a group of suburban cottages, another in the barracks of a former labor depot. Both were crowded and sanitation suffered. There was some typhoid and dysentery at the time of the visit in January 1946, but fortunately the water supply was safe. Measles was sweeping one of the camps, and had caused several deaths on a homeward-bound steamer. When rescued, many of the internees were suffering from nutritional and other chronic diseases. They were cared for in an excellent private hospital, the Tjikini, taken back from the Japanese, and were sent home in a hospital ship as one was available. In January only two cases of malnutrition were to be seen, both convalescent.

Batavia housed another group of refugees, "Iftu" (Indonesians friendly to us) the Dutch called them. Some 20,000 were frightened from their homes by threats of the republicans, and crowded into the city. Eight hundred were under one barracks roof, each family's little belongings arranged in a square on the floor. They were a neat people, but it was providential indeed that no epidemic broke out.

The medical school buildings in Batavia were in the hands of the Indonesians, but no classes were being held. A nutrition team of field and laboratory workers, trained by an English team during the liberation of Holland, was making surveys in Batavia and other centers. At Batavia they found the vitamin A content of the blood of the internees very low.

#### SUMMARY

The author visited seven important cities in Southeast Asia—Manila, Batavia, Singapore, Rangoon, Bangkok, Saigon, and Hong-kong—from 4 to 7 months after liberation. In each of these cities experienced staffs were attacking the problems of liberation with stout courage. Personnel was usually limited, and medical supplies were always short. There were other administrative difficulties.

After liberation there was usually a sharp increase in dysentery, which disappeared fairly quickly. Typhoid, however, never became

really epidemic. Cholera was serious in Bangkok, was found in Rangoon, and was beginning to extend to Hongkong from Canton.

Tuberculosis, always high in this area, remained a serious problem, particularly in Singapore, Manila, and Hongkong.

Beriberi was most devastating in Manila, Singapore, and Saigon. Batavia and Singapore had special workers in nutrition.

Malaria was the fourth horseman in most of these cities, particularly Singapore, Rangoon, Hongkong, and Manila, which had been relatively free from malaria before the war.

Influenza appeared in Manila, in the early days after liberation and respiratory diseases other than tuberculosis remained the leading cause of death in Rangoon.

Smallpox was raging in Bangkok, was moderately epidemic in Rangoon, started in Saigon, infiltrated into Hongkong, and appeared in June 1946 in Singapore.

Diphtheria was endemic in Manila and Hongkong, and began to be so in Singapore in January of 1946. Measles became epidemic in Manila, with high mortality, and was becoming of importance in Hongkong.

Saigon, Manila, Bangkok, and Batavia have laboratory facilities for the production of vaccines. Each laboratory is a means of general protection to the whole area.

With increasing civilian traffic, both by sea and by air, health authorities felt the need of interchange of epidemiological information in this area.

Much has been accomplished in these cities since liberation, but much remains to be done.

## INCIDENCE OF HOSPITALIZATION, JULY 1946

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country, mostly in large cities.

Item	July	
	1946	1945
1. Number of plans supplying data.....	81	79
2. Number of persons eligible for hospital care.....	20,082,148	18,044,754
3. Number of persons admitted for hospital care.....	206,766	179,472
4. Incidence per 1,000 persons, annual rate during current month (daily rate × 365).....	121.2	117.1
5. Incidence per 1,000 persons, annual rate for the 12 months ended July 31, 1946.....	109.1	105.5
6. Number of plans reporting on hospital days.....	30	32
7. Days of hospital care per case discharged during month <sup>1</sup> .....	7.81	7.12

<sup>1</sup> Days include entire stay of patient in hospital whether at full pay or at a discount.

## DEATHS DURING WEEK ENDED AUGUST 17, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 17, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	7,673	7,642
Average for 3 prior years.....	8,023	
Total deaths, first 33 weeks of year.....	305,057	299,879
Deaths under 1 year of age.....	701	534
Average for 3 prior years.....	617	
Deaths under 1 year of age, first 33 weeks of year.....	20,808	19,956
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67,258,712	67,366,171
Number of death claims.....	10,747	6,180
Death claims per 1,000 policies in force, annual rate.....	8.3	4.8
Deaths claims per 1,000 policies, first 33 weeks of year, annual rate.....	9.9	10.4

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED AUG. 24, 1946

#### Summary

A total of 1,806 cases of poliomyelitis was reported for the week, as compared with 1,814 last week, 931 and 1,530 for the corresponding weeks, respectively, of last year and 1944, and a 5-year (1941-45) median of 872. Net increases were reported in the Middle and South Atlantic, East Central, and Pacific areas, while decreases were recorded in the New England, West Central, and Mountain areas. Decreased incidence was reported in 20 of the 39 States reporting 5 or more cases. States reporting currently more than 13 cases are as follows (last week's figures in parentheses): *Increases*—Vermont 17 (14), New York 105 (57), Indiana 20 (18), Michigan 76 (70), Wisconsin 95 (48), Iowa 43 (40), South Dakota 74 (28), Georgia 15 (4), Tennessee 19 (10), Arkansas 35 (23), Washington 31 (27), California 195 (152); *decreases*—New Jersey 16 (19), Pennsylvania 16 (19), Illinois 183 (204), Minnesota 263 (366), Missouri 95 (105), North Dakota 40 (48), Nebraska 29 (35), Kansas 60 (73), Alabama 21 (23), Mississippi 22 (31), Louisiana 21 (22), Texas 34 (49), Colorado 78 (82). Ohio and Oregon reported the same numbers for both weeks (48 and 12, respectively).

Of the cumulative total, 10,650 (as compared with 5,239 last year, 7,792 in 1944, and a 5-year median of 4,930 for the period), 11 States reported 6,880 cases, or nearly 65 percent, as follows (last year's corresponding figures in parentheses): Minnesota 1,612 (35), California 873 (291), Illinois 845 (338), Texas 664 (681), Colorado 502 (43), Missouri 478 (56), New York 455 (870), Florida 437 (47), Kansas 413 (36), Michigan 313 (61), and Alabama 288 (109).

Of 32 cases of Rocky Mountain spotted fever reported currently, Virginia and Georgia reported 6 each, North Carolina 4, and Illinois 3. The cumulative figure is 448, as compared with 372 for the corresponding period last year and a 5-year median of 381.

Deaths recorded for the week in 93 large cities of the United States totaled 8,091, as compared with 7,673 last week, 8,557 and 7,472 for the corresponding weeks of 1945 and 1944, respectively, and a 3-year (1943-45) average of 7,963. The cumulative figure is 313,148, as compared with 308,436 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Aug. 24, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Aug. 24, 1946	Aug. 25, 1945		Aug. 24, 1946	Aug. 25, 1945		Aug. 24, 1946	Aug. 25, 1945		Aug. 24, 1946	Aug. 25, 1945	
NEW ENGLAND												
Maine.....	1	0	0	—	—	—	4	1	5	0	0	0
New Hampshire.....	0	0	0	—	—	—	11	—	2	0	1	0
Vermont.....	1	0	0	—	—	—	8	2	5	0	1	0
Massachusetts.....	3	2	2	—	—	—	76	48	48	0	2	4
Rhode Island.....	1	0	0	—	30	1	13	—	—	0	0	0
Connecticut.....	0	0	0	—	—	—	32	5	11	1	0	1
MIDDLE ATLANTIC												
New York.....	16	13	8	13	11	(1)	61	26	52	4	12	12
New Jersey.....	3	2	1	1	2	2	51	11	31	1	2	5
Pennsylvania.....	4	6	6	1	—	—	53	22	22	8	6	6
EAST NORTH CENTRAL												
Ohio.....	4	5	6	2	—	3	49	5	18	3	6	5
Indiana.....	4	4	4	—	3	4	4	4	4	1	0	2
Illinois.....	11	2	5	—	—	2	11	58	24	3	10	8
Michigan <sup>1</sup> .....	18	6	5	1	—	—	23	30	32	4	3	3
Wisconsin.....	8	0	2	4	11	10	45	83	76	1	6	4
WEST NORTH CENTRAL												
Minnesota.....	3	7	3	—	—	—	3	2	6	0	1	0
Iowa.....	0	1	1	—	—	—	4	2	4	1	2	2
Missouri.....	2	1	1	—	—	—	3	4	7	0	2	2
North Dakota.....	1	5	0	—	4	4	—	3	3	0	0	0
South Dakota.....	0	2	2	—	—	—	—	2	2	0	0	0
Nebraska.....	2	4	1	2	—	2	1	2	2	1	0	0
Kansas.....	13	10	2	2	—	—	2	5	11	1	0	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	—	—	—	0	0	0
Maryland <sup>2</sup> .....	9	10	3	—	—	1	15	1	4	3	1	2
District of Columbia.....	0	0	0	—	—	—	10	—	1	2	0	0
Virginia.....	5	7	9	119	147	58	19	6	6	2	3	3
West Virginia.....	5	5	4	2	—	—	—	1	1	0	0	0
North Carolina.....	10	33	18	—	—	—	1	1	14	2	4	2
South Carolina.....	5	16	15	106	101	101	33	7	10	0	1	1
Georgia.....	9	22	11	3	2	7	17	2	3	0	0	0
Florida.....	8	2	2	2	1	2	1	3	3	1	0	0
EAST SOUTH CENTRAL												
Kentucky.....	5	12	6	—	—	—	1	10	6	2	0	0
Tennessee.....	3	6	6	1	5	8	7	1	4	3	2	1
Alabama.....	7	26	16	3	24	7	9	1	6	1	3	3
Mississippi <sup>2</sup> .....	12	11	5	—	—	—	—	—	—	2	2	2
WEST SOUTH CENTRAL												
Arkansas.....	8	2	7	—	4	4	8	2	6	0	2	0
Louisiana.....	1	5	5	—	15	1	5	1	1	0	1	0
Oklahoma.....	4	4	3	—	12	6	1	3	4	1	0	0
Texas.....	18	56	18	306	522	251	73	44	35	2	9	3
MOUNTAIN												
Montana.....	1	0	1	—	—	—	10	2	3	1	0	0
Idaho.....	2	0	0	23	1	—	1	14	—	0	0	0
Wyoming.....	0	0	0	—	—	—	8	3	3	0	0	9
Colorado.....	6	3	3	5	18	13	4	6	8	0	2	1
New Mexico.....	0	7	1	—	—	—	5	—	2	0	0	0
Arizona.....	0	2	1	12	17	19	2	4	8	1	0	0
Utah <sup>2</sup> .....	2	1	0	—	—	—	3	50	6	0	0	0
Nevada.....	0	0	0	—	—	—	—	—	—	0	0	0
PACIFIC												
Washington.....	10	4	1	—	—	—	—	42	32	0	0	1
Oregon.....	2	3	3	—	1	1	10	5	8	0	0	0
California.....	12	12	12	4	8	13	40	129	103	3	8	7
Total.....	239	818	224	602	929	539	737	650	696	55	92	92
24 weeks.....	10,141	8,610	7,623	192,424	71,661	82,248	638,379	101,897	538,338	4,512	6,268	5,268

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.



Telegraphic morbidity reports from State health officers for the week ended Aug. 24, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio myelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Aug. 24, 1946	Aug. 25, 1945		Aug. 24, 1946	Aug. 25, 1945		Aug. 24, 1946	Aug. 25, 1945		Aug. 24, 1946	Aug. 25, 1945	
NEW ENGLAND												
Maine.....	2	4	2	7	18	6	0	0	0	1	2	2
New Hampshire.....	13	4	0	3	8	2	0	0	0	0	0	0
Vermont.....	4	1	1	1	4	1	0	0	0	0	0	0
Massachusetts.....	17	37	8	30	35	30	0	0	0	27	8	6
Rhode Island.....	3	0	1	3	4	3	0	0	0	0	1	0
Connecticut.....	2	16	16	4	6	6	0	0	0	0	2	1
MIDDLE ATLANTIC												
New York.....	105	191	66	45	78	40	0	0	0	17	13	13
New Jersey.....	16	88	26	23	22	15	0	0	0	4	9	4
Pennsylvania.....	16	65	65	21	34	30	0	0	0	5	7	11
EAST NORTH CENTRAL												
Ohio.....	48	30	30	34	55	55	0	0	0	4	1	7
Indiana.....	20	10	10	21	14	9	2	0	0	1	1	2
Illinois.....	183	121	38	34	52	37	0	0	0	4	7	7
Michigan <sup>2</sup> .....	76	13	11	19	69	27	0	2	0	7	3	3
Wisconsin.....	95	15	8	17	30	28	1	0	0	2	2	1
WEST NORTH CENTRAL												
Minnesota.....	263	14	14	11	19	14	0	0	0	0	0	0
Iowa.....	43	19	13	4	9	9	0	0	0	0	13	3
Missouri.....	95	8	8	8	15	8	0	0	0	1	0	7
North Dakota.....	40	0	1	1	8	1	0	0	0	0	1	1
South Dakota.....	74	0	0	2	2	2	0	0	0	1	0	0
Nebraska.....	29	5	7	8	8	5	0	2	1	1	0	0
Kansas.....	60	3	3	13	16	16	0	0	0	1	0	3
SOUTH ATLANTIC												
Delaware.....	3	1	1	3	0	2	0	0	0	0	0	0
Maryland <sup>2</sup> .....	12	9	9	5	11	11	0	0	0	0	0	3
District of Columbia.....	2	17	6	3	10	4	0	0	0	2	1	1
Virginia.....	11	20	9	10	29	18	0	0	0	2	4	8
West Virginia.....	5	7	4	7	28	21	0	0	0	0	2	6
North Carolina.....	4	11	4	10	35	30	0	0	0	1	3	7
South Carolina.....	0	17	5	3	8	5	0	0	0	1	5	5
Georgia.....	15	2	2	11	8	8	0	0	0	5	9	15
Florida.....	11	2	2	2	3	3	0	0	0	1	4	4
EAST SOUTH CENTRAL												
Kentucky.....	10	4	16	16	22	21	0	1	0	6	5	8
Tennessee.....	19	24	10	9	22	15	0	0	0	5	15	6
Alabama.....	21	5	5	8	6	13	0	0	0	0	8	6
Mississippi <sup>2</sup> .....	22	4	2	3	5	6	0	0	0	2	3	5
WEST SOUTH CENTRAL												
Arkansas.....	35	2	2	4	5	3	0	0	0	1	3	5
Louisiana.....	21	4	2	2	5	3	0	0	0	17	2	6
Oklahoma.....	13	7	1	3	5	4	0	0	0	2	4	10
Texas.....	34	73	7	19	32	19	0	0	0	9	33	30
MOUNTAIN												
Montana.....	8	1	0	0	4	9	0	0	0	1	3	1
Idaho.....	1	0	0	4	3	3	0	0	0	3	0	1
Wyoming.....	12	2	1	1	1	2	0	0	0	0	0	0
Colorado.....	78	12	7	23	5	6	0	0	0	0	1	1
New Mexico.....	11	3	2	1	3	2	0	0	0	1	1	3
Arizona.....	8	3	1	6	0	1	0	0	0	1	3	2
Utah <sup>2</sup> .....	8	14	3	11	7	2	0	0	0	0	2	2
Nevada.....	0	0	0	0	0	0	0	0	0	1	0	0
PACIFIC												
Washington.....	31	16	5	17	9	9	0	0	0	2	0	0
Oregon.....	12	3	3	6	5	11	0	0	0	0	2	2
California.....	195	24	16	50	85	52	0	0	0	4	1	3
Total.....	1,806	931	872	546	865	647	1	.5	3	143	184	200
34 weeks.....	*10,650	5,239	4,930	87,385	135,413	98,496	279	270	609	2,662	2,918	3,486

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Maine 1; Massachusetts (salmonella infection) 2; New York 1; New Jersey 4; Ohio 2; Michigan 1; Georgia 2; Louisiana 1; Texas 2; Montana 1; California 1.

<sup>3</sup> Correction polio myelitis Mississippi, additions, Jan. 4 to Aug. 16, 7 cases (included in cumulative totals only); Nebraska, week ended Aug. 10, 41 cases (instead of 45), week ended Aug. 17, 35 cases (instead of 39).

Telegraphic morbidity reports from State health officers for the week ended Aug. 24, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Aug. 24, 1946								
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infec- tious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- de- fined fever	
	Aug. 24, 1946	Aug. 25, 1945		Ame- bic	Bac- terial	Un- spec- ified						
NEW ENGLAND												
Maine.....	10	34	13	—	—	—	—	—	—	—	1	
New Hampshire.....	5	—	1	—	—	—	—	—	—	—	1	
Vermont.....	5	20	20	—	—	—	—	—	—	—	1	
Massachusetts.....	107	131	124	—	1	—	—	—	—	—	1	
Rhode Island.....	35	9	13	—	—	—	—	—	—	—	—	
Connecticut.....	25	28	44	—	—	—	—	—	—	—	3	
MIDDLE ATLANTIC												
New York.....	129	417	253	2	6	—	3	1	—	—	11	
New Jersey.....	118	196	129	1	1	6	—	1	—	—	2	
Pennsylvania.....	105	173	193	1	—	—	1	1	—	—	1	
EAST NORTH CENTRAL												
Ohio.....	84	158	179	5	—	—	—	1	—	—	1	
Indiana.....	14	28	28	—	—	—	3	1	1	—	3	
Illinois.....	150	99	123	6	2	—	4	3	—	—	12	
Michigan.....	216	170	182	—	4	—	—	—	—	—	5	
Wisconsin.....	215	72	208	4	—	—	—	—	—	—	6	
WEST NORTH CENTRAL												
Minnesota.....	12	27	44	1	—	—	—	—	—	—	3	
Iowa.....	8	9	13	2	—	—	—	1	—	—	21	
Missouri.....	23	29	20	—	—	—	—	1	—	—	3	
North Dakota.....	1	2	12	—	—	—	—	—	—	—	—	
South Dakota.....	1	1	6	—	—	—	—	—	—	—	1	
Nebraska.....	5	—	4	—	—	—	1	—	—	—	1	
Kansas.....	12	18	45	—	—	—	—	—	—	—	2	
SOUTH ATLANTIC												
Delaware.....	1	3	3	—	—	—	—	—	—	—	—	
Maryland.....	28	63	61	—	—	—	1	1	—	—	—	
District of Columbia.....	5	15	15	—	—	—	—	—	—	—	—	
Virginia.....	49	61	51	—	—	74	—	6	1	—	2	
West Virginia.....	15	4	13	—	—	—	—	—	—	—	1	
North Carolina.....	33	75	107	—	—	—	—	4	—	2	1	
South Carolina.....	25	95	53	—	19	—	—	—	—	6	6	
Georgia.....	8	16	19	2	1	1	—	6	1	28	7	
Florida.....	18	2	4	—	—	—	—	—	—	11	1	
EAST SOUTH CENTRAL												
Kentucky.....	14	23	50	—	—	—	—	1	—	—	6	
Tennessee.....	24	22	37	—	3	1	—	1	3	—	1	
Alabama.....	2	19	15	—	—	—	—	—	—	14	3	
Mississippi.....	—	—	—	—	—	—	—	—	—	6	2	
WEST SOUTH CENTRAL												
Arkansas.....	10	6	7	2	—	—	—	—	—	—	4	
Louisiana.....	3	8	8	3	1	—	—	—	—	—	—	
Oklahoma.....	15	7	4	—	—	—	—	—	—	—	—	
Texas.....	126	235	186	63	217	6	—	1	—	57	19	
MOUNTAIN												
Montana.....	6	7	21	—	—	—	—	—	—	—	—	
Idaho.....	4	8	8	—	1	—	—	—	—	—	—	
Wyoming.....	4	4	4	1	—	—	—	—	—	—	—	
Colorado.....	22	44	34	—	1	—	—	—	—	—	1	
New Mexico.....	3	11	14	—	2	—	1	—	—	—	1	
Arizona.....	7	11	13	—	—	9	—	—	—	—	—	
Utah.....	8	35	35	—	1	—	—	—	1	—	1	
Nevada.....	—	—	—	—	—	—	—	—	—	—	—	
PACIFIC												
Washington.....	28	17	17	—	—	4	—	—	—	—	3	
Oregon.....	8	5	16	—	—	—	—	2	—	—	—	
California.....	43	144	144	5	5	—	6	—	—	1	2	
Total.....	1,789	2,551	2,767	99	255	101	20	32	9	132	133	
Same week, 1945.....	2,551	—	—	46	655	508	23	22	7	222	71	
Average, 1943-45.....	2,445	—	—	43	536	386	25	16	11	153	—	
34 weeks: 1946.....	66,332	—	—	1,931	11,554	4,637	407	448	632	2,218	3,348	
1945.....	86,745	—	—	1,229	16,660	6,643	302	372	529	2,899	3,181	
Average, 1943-45.....	95,532	—	—	1,258	13,951	5,681	324	381	507	2,341	—	

\* Period ended earlier than Saturday.

Leptosy: Florida 1 case; Texas 1 case.

\* 5-year median, 1941-45.

NOTIFIABLE DISEASES, SECOND QUARTER, 1946<sup>1</sup>

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for April, May, and June 1946. These reports are preliminary and the figures are therefore more or less incomplete and subject to correction by final reports. In most instances they include cases reported in both civilian and military populations. The comparisons made are with similar preliminary reports; but, owing to population shifts and the presence of large military populations in certain States, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The lists of diseases required to be reported are not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic prevalence of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for April, May, and June 1946

Division and State	Anthrax	Chick- enpox	Con- juncti- vitis	Diph- theria	Dysen- tery, amebic	Dysen- tery, bacil- lary	Dysen- tery, unde- fined	En- ceph- alitis, infec- tious	Ger- man mea- sles	Hook- worm disease	Influenza	Ma- laria	Mea- sles*	Men- ingitis, menin- gococ- cus*	Mumps	Oph- thal- mia neona- torum	Pella- gra	Pneu- monia, all forms
NEW ENGLAND																		
Maine		663		39	2				462		31	37	2,315	6	2,060			197
New Hampshire		147		1					376		4	7	1,561	7	351			15
Vermont		939		6					1,269		2		1,163	3	897			15
Massachusetts	1	6,490	108	69		17		2	3,230	2	189		27,992	26	2,384	45		36
Rhode Island				6		3		1	24		5		64	6	94			408
Connecticut		1,962	8	21	7	3		2	1,367	2	9	116	5,522	24	3,545	1		60
MIDDLE ATLANTIC																		
New York	2	8,391		245	72	117		14	6,109		42	451	51,594	157	2,903	12		3,679
New Jersey	1	5,792		84	8	10	12	2	40,567		37	270	40,567	64	4,519	7		896
Pennsylvania	7	6,374		206		3		6			24		35,711	119	5,749	1		975
EAST NORTH CENTRAL																		
Ohio		3,886	1	172	1		2	1	1,342		41	72	9,995	62	3,241	126		676
Indiana		887	8	93	5	3	1	2	121	6	87	79	5,921	31	1,467	1		65
Illinois		3,626		104	61			20	520		57	143	9,877	82	1,950	114		1,679
Michigan		4,256	66	69	10	17		1	2,102		9	568	16,836	54	3,740	6		615
Wisconsin		6,269		27	3			2	4,287		173	25	35,463	30	7,740	3		186



## Consolidated monthly State morbidity reports for April, May, and June 1946—Continued

Division and State	Polio- myelitis*	Rabies in man	Rheu- matic fever	Rocky Moun- tain spotted fever	Scar- let fever*	Septic throat	Small pox*	Teta- nus	Tra- cheo- ma	Tri- ch- inosis	Tuber- culosis, all forms*	Tuber- culosis, respir- atory	Tu- ber- culosis, respir- atory	Ty- phoid and para- ty- phoid fever*	Para- ty- phoid fever	Ty- phus fever, demic	Un- dulant fever*	Vin- cent's infection	Whoop- ing cough*
NEW ENGLAND																			
Maine	2				301	10					100	149		10	1		16	14	230
New Hampshire	2				298	24					35			1			7	3	106
Vermont	2				2	32					38			1			23	4	239
Massachusetts	3				2,108	32		6		9	899	840		51	43		18	13	1,538
Rhode Island					145	8					13	138		4			1		280
Connecticut	4				617	79				1	283	274		8	4		16		593
MIDDLE ATLANTIC																			
New York	68			2	117,056			2		4	3,728	3,502	1	29	2	3	83		1,877
New Jersey	14			4	1,735	36		1	1	6	930			15	3		14		1,738
Pennsylvania	16	1	343	6	3,172			3			1,056		1	47			17		1,373
EAST NORTH CENTRAL																			
Ohio	21	2	36	1	3,928	9	4	2	3	2	1,485		1	26	3		25	12	962
Indiana	10				751	62	22	4			797	747	1	5			36	12	348
Illinois	55		147	3	2,072	52	4	6	9		1,515	1,381	5	17	13		147	86	1,237
Michigan	7		79		1,955	92	1	6	1	2	1,270			13	17	13	46		1,556
Wisconsin	3				1,269	7	2		1		602		7	4			89		1,316
WEST NORTH CENTRAL																			
Minnesota	19		24		592	140	2	3			7,586		4	13	13		114	15	180
Iowa	18		1		563	40	7				301			14			118	3	397
Missouri	15		7	1	478	7	3				52		6	19	3	1	5	24	116
North Dakota	2		2		83	3				8	58	58		11			20	1	11
South Dakota	3			1	103	4	4				54	3		17			15	34	34
Nebraska	3				236		5				190		1	6	1		101	41	320
Kansas	30		1		519	8	4	3	1		251	249	2						
SOUTH ATLANTIC																			
Delaware	1			7	59						42	42	2	4			2		16
Maryland	3		30	26	819	27		3			723	688	2	7	1		17	6	236
District of Columbia					204						505	480		8					109
Virginia	2			31	396			1			848	848	11	20	2	2	18		882
West Virginia	5				284	1					432		1	13			3		463
North Carolina	24			16	571	14					849	826	6	12		19	1		1,177
South Carolina	28		122	7	77			3			164		8	38	7	20	9		685
Georgia	28		7	8	84	58	1	6			478	473	13	49	25	114	47	6	192
Florida	228	1			51	41		9			281	275		27	12	91	11	31	943

EAST SOUTH CENTRAL									
Kentucky	15	5	261	8	4	4	13	694	691
Tennessee	9	8	231	34	1	4	2	1,262	1,262
Alabama	90	1	212	11	11	18	18	1,036	1,036
Mississippi	30		104					526	526
WEST SOUTH CENTRAL									
Arkansas	17	1	96	67	1	2	55	337	327
Louisiana	52	80	89	131	2	18	1	508	488
Oklahoma	32	7	105	47	3	1	29	710	710
Texas	261		464	121	4		17	1,557	1,557
MOUNTAIN									
Montana	5	3	111	13			11	93	11
Idaho		10	81	66	3			63	21
Wyoming		11	88	8				6	4
Colorado	73	118	453	276	7	49	4	49	10
New Mexico	9		82	3	2			7,868	7,843
Arizona	4		119				94	333	36
Utah	6	35	260					36	9
Nevada		1	35	13	3		4	35	
PACIFIC									
Washington	22	75	298	17	57		1	668	12
Oregon	1	17	389	10		2	1	197	18
California	127	227	2,144		6	16	11	2,432	59
Total	1,334	6	39,428	1,985	150	111	277	40,514	16,342
Second quarter 1945	807	149	54,069	2,447	101	113	352	39,311	18,233
Median 1941-45	628	9	43,121	2,447	245	110	699	94,311	18,233
Alaska				1				73	66
Hawaii Territory	1		7	30		4		568	559
Panama Canal Zone			2					10	10

\* Diseases marked with an asterisk (\*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the

District of Columbia but is not included in the table. Chickenpox, conjunctivitis, influenza, and pellagra were dropped from the list of reportable diseases in North Carolina in 1945. Rheumatic fever has been made reportable in Louisiana.

See footnotes on p. 1360.

## FOOTNOTES FOR TABLE ON PAGES 1356 TO 1359

<sup>1</sup> Figures for Alaska are for April and May only. For report for first quarter of 1946 see page 886 of the PUBLIC HEALTH REPORTS for June 7, 1946.

<sup>2</sup> Includes cases of kerato- and suppurative conjunctivitis and of pink eye.

<sup>3</sup> In a few States practically all contracted outside Continental United States.

<sup>4</sup> Lobar pneumonia only.

<sup>5</sup> New York City only.

<sup>6</sup> Includes 1 case acquired through blood transfusion.

<sup>7</sup> Includes 1 case acquired.

<sup>8</sup> The number of cases of malaria reported in Florida for the first quarter of 1946 should be 87 instead of 114 as published on page 887 of the PUBLIC HEALTH REPORTS for June 7, 1946. This will make the total number of cases of malaria reported in the United States for the first quarter of 1946 10,930 instead of 10,978 as published on the same page.

<sup>9</sup> Includes the Isles of Colon and Panama.

<sup>10</sup> In the Canal Zone only.

<sup>11</sup> Includes septic sore throat.

<sup>12</sup> Includes cases reported as "salmonella infections."

<sup>13</sup> Nonresident.

<sup>14</sup> Exclusive of 21 cases delayed reports.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses where no figures are given, no cases were reported last year:

<sup>1</sup> Actinomycosis: Connecticut 1, Illinois 1, Michigan 2 (2), Minnesota 4 (1), Iowa 1, South Dakota 1, Tennessee 1, Montana 1.

<sup>2</sup> Beriberi: Florida 2.

<sup>3</sup> Botulism: California 3 (6).

<sup>4</sup> Coccidioidomycosis: Arizona 7 (2), California 7 (11).

<sup>5</sup> Colorado tick fever: Wyoming 3 (2), Colorado 27 (31).

<sup>6</sup> Dengue: Maryland 1 (contracted outside the United States), North Carolina 1, South Carolina 6 (3), Florida 1, Texas 7 (12), Arizona 1.

<sup>7</sup> Diarrhea: New Jersey 2 (2), Ohio 15 (81) (diarrhea and enteritis), Illinois 52, North Dakota 6, Maryland 20 (14), South Carolina 4,015 (4,972), Florida 19 (10), Colorado 5 (diarrhea and enteritis), New Mexico 1 (32), Utah 3 (6), California 2 (6).

<sup>8</sup> Dog bites: Illinois 3,982 (3,701) (all animal bites), Michigan 2,683 (2,986), Arkansas 250 (107).

Favus: Michigan 1.  
Food poisoning: Maine 58, Illinois 5 (102), Kansas 20, Louisiana 14 (5), Idaho 1, Nevada 3 (1), Washington 20 (5), California 187 (188).

Granuloma (unspecified): Ohio 15 (13).

Granuloma inguinale: Missouri 3 (4), Florida 56 (64), Tennessee 31 (16), Mississippi 144 (142), Louisiana 75 (45), Utah 2.

Impigo conjunctivae: Ohio 6, Indiana 12 (10), Illinois 6 (20), Michigan 177 (188), Iowa 1 (1), North Dakota 2 (1), Maryland 1 (2), Montana 7 (4), Idaho 2, Wyoming 9 (3), Colorado 18 (1), Nevada 47 (30), Washington 144 (77), Hawaii Territory 2 (34).

Jaundice (including hepatitis and Weil's disease): Maine 3, Pennsylvania 17, Ohio 2, Indiana 21 (3), Illinois 45 (135), Michigan 9 (47), Minnesota 26 (2), Iowa 1 (3), North Dakota 5, Maryland 5 (6), Florida 11 (9), Montana 1 (1), Idaho 9 (11), Utah 9, Washington 16 (36), Oregon 12 (6), California 69 (68), Hawaii Territory 2 (47).

Lead poisoning: Minnesota 1.

Leprosy: New York 1, Florida 6, Louisiana 1 (1), Texas 2 (4), Washington 1 (1), California 4 (6), Hawaii Territory 7 (4), Panama Canal Zone 1.

Lymphocytic choriomeningitis: Tennessee 5 (12).

Lymphogranuloma venereum: Missouri 3 (4), Florida 40 (39), Tennessee 30 (22), Louisiana 25 (35), Utah 4 (2).

Psittacosis: Massachusetts 1, New York 1 (2), Washington 2, California 3.

Pyoperitoneal septicaemia: Tennessee 1 (1), Mississippi 43 (43), Louisiana 1 (6), New Mexico 1, Nevada 1 (1).

Rabies in animals: Massachusetts 1, New York 269 (189), Pennsylvania 2, Ohio 243 (269), Illinois 85 (142), Michigan 5 (12), Iowa 23 (14), Missouri 6 (21), Kansas 4 (2), Maryland 18 (12), District of Columbia 1 (41), West Virginia 1, South Carolina 43 (44), Florida 15 (2), Alabama 229 (238), Arkansas 44 (52), Louisiana 12 (20), Texas 373 (355), Colorado 2, New Mexico 1 (2), Utah 2 (14), California 152 (264).

Rat bite fever: Tennessee 2.

Relapsing fever: Texas 4 (1), Arizona 1.

Ringsworm: Pennsylvania 114 (208), Ohio 18, Indiana 308, Michigan 264 (437), Minnesota 47 (339), Iowa 3 (1), Missouri 3 (504), Montana 1, Idaho 4 (1), Utah 250, Nevada 1 (6), Washington 96 (163).

Scabies: Pennsylvania 63 (29), Ohio 2, Indiana 1, Michigan 21 (201), Missouri 9 (1), Kansas 5, Montana 9 (9), Idaho 24 (45), Wyoming 1 (4), Arizona 1, Nevada 15 (20).

Silicosis: New Mexico 4.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 17, 1946

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0		0	1	0	3	1	1	0	1	8
New Hampshire:												
Concord.....	0	0		0		0	1	0	0	0	0	
Massachusetts:												
Boston.....	2	0		1	12	1	1	9	13	0	0	24
Fall River.....	0	0		0	1	0	0	0	2	0	0	4
Springfield.....	0	0		0	5	0	0	1	0	0	0	11
Worcester.....	0	0		0	5	0	4	0	0	0	0	21
Rhode Island:												
Providence.....	0	0		0	1	0	0	1	1	0	1	21
Connecticut:												
Bridgeport.....	0	0		0		0	0	0	0	0	0	
Hartford.....	0	0		0	1	1	0	0	0	0	0	9
New Haven.....	0	0		0	5	0	0	0	0	0	0	
MIDDLE ATLANTIC												
New York:												
Buffalo.....	6	0		0		0	2	0	1	0	0	10
New York.....	6	1	4	0	30	2	25	30	15	0	6	55
Rochester.....	0	0		0		0	1	4	2	0	0	2
Syracuse.....	1	0		0		0	1	4	3	0	0	4
New Jersey:												
Camden.....	0	0		0		0	1	0	0	0	0	5
Newark.....	1	0	1	0	1	1	2	0	2	0	0	30
Trenton.....	0	0		0	2	0	0	0	0	0	0	3
Pennsylvania:												
Philadelphia.....	1	0	1	0	6	0	12	3	4	0	1	35
Pittsburgh.....	0	0		0	1	1	4	6	2	0	0	7
Reading.....	0	0		0	1	0	0	0	1	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0	2	0	2	1	4	10	3	0	0	11
Cleveland.....	1	0		0	22	1	5	17	4	0	1	6
Columbus.....	0	0		0	2	0	0	1	3	0	0	16
Indiana:												
Fort Wayne.....	0	0		0		0	0	0	0	0	0	2
Indianapolis.....	0	0		0		1	1	2	5	0	0	10
South Bend.....	0	0		0		1	0	1	0	0	0	
Terre Haute.....	0	0		0		0	2	0	0	0	0	1
Illinois:												
Chicago.....	0	0		0	6	1	12	48	7	0	0	93
Michigan:												
Detroit.....	9	0		0	5	0	1	25	4	0	2	80
Flint.....	1	0		0		0	0	5	1	0	0	
Grand Rapids.....	0	0		0	2	0	1	9	2	0	0	11
Wisconsin:												
Kenosha.....	0	0		0		0	0	11	0	0	0	4
Milwaukee.....	1	0		0	3	0	4	8	10	0	2	121
Racine.....	0	0		0	3	0	0	0	0	0	0	5
Superior.....	2	0		0	1	0	0	0	0	0	0	5
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0		0	1	0	0	6	0	0	0	1
Minneapolis.....	0	0		0	5	0	2	111	3	0	0	
St. Paul.....	0	0		0	1	1	0	41	4	0	0	5
Missouri:												
Kansas City.....	0	0		0		0	4	11	0	0	1	6
St. Joseph.....	0	0		0		0	0	1	2	0	0	
St. Louis.....	3	0	1	0	5	0	12	37	0	0	0	7
Nebraska:												
Omaha.....	0	0		0		0	2	26	0	0	1	



## City reports for week ended Aug. 17, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Kansas:												
Topeka.....	0	0	-----	0	2	0	0	3	0	0	1	5
Wichita.....	0	0	-----	0	1	0	5	4	0	0	1	2
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	-----	0	0	0	1	0	1	-----
Maryland:												
Baltimore.....	4	0	-----	0	17	0	2	2	1	0	1	15
Cumberland.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Frederick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0	-----	0	4	3	4	2	4	0	1	9
Virginia:												
Lynchburg.....	1	0	-----	0	-----	0	0	0	2	0	0	-----
Richmond.....	0	0	-----	0	1	0	1	0	0	0	0	10
Roanoke.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
West Virginia:												
Charleston.....	0	0	-----	0	-----	0	0	2	0	0	0	-----
Wheeling.....	0	0	-----	0	-----	0	0	0	0	0	0	5
North Carolina:												
Raleigh.....	0	0	-----	0	-----	0	0	0	2	0	0	6
Wilmington.....	0	0	-----	0	1	0	1	0	0	0	0	-----
Winston-Salem.....	0	0	-----	0	-----	0	0	0	2	0	0	3
South Carolina:												
Charleston.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Georgia:												
Atlanta.....	0	0	-----	0	1	0	1	4	2	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Savannah.....	0	0	2	0	2	0	0	0	0	0	0	-----
Florida:												
Tampa.....	0	0	3	0	-----	0	2	1	1	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	-----	0	3	0	4	3	0	0	0	7
Nashville.....	0	0	-----	0	-----	0	4	0	0	0	0	1
Alabama:												
Birmingham.....	1	0	-----	0	-----	1	1	9	1	0	2	-----
Mobile.....	0	0	3	0	-----	0	0	2	0	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	-----	0	0	2	0	0	0	-----
Louisiana:												
New Orleans.....	*12	0	*5	0	*12	*1	*7	7	3	0	0	*8
Shreveport.....	0	0	-----	0	-----	0	3	3	0	0	0	-----
Texas:												
Dallas.....	0	0	-----	0	-----	0	2	11	0	0	1	2
Galveston.....	1	0	-----	0	-----	0	0	0	0	0	0	-----
Houston.....	0	0	1	0	-----	0	5	0	0	0	0	2
San Antonio.....	4	0	-----	0	-----	0	3	0	2	0	0	4
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	2	0	1	0	2	0	0	-----
Great Falls.....	0	0	-----	0	3	0	0	0	0	0	0	-----
Helena.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Missoula.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Colorado:												
Denver.....	2	0	1	0	1	0	11	24	10	0	1	11
Pueblo.....	0	0	-----	0	-----	0	0	2	0	0	0	-----
Utah:												
Salt Lake City.....	0	0	-----	0	3	0	0	0	3	0	1	4

\*Includes monthly report from Charity Hospital; figures not used in computing rates.

## City reports for week ended Aug. 17, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	14	0	-----	0	3	0	0	3	2	0	0	6
Spokane.....	0	0	-----	0	-----	0	0	4	0	0	0	-----
Tacoma.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
California:												
Los Angeles.....	5	0	1	0	9	2	0	64	9	0	0	6
Sacramento.....	0	0	-----	0	-----	0	1	0	3	0	0	-----
San Francisco.....	2	0	-----	0	3	0	2	1	4	0	0	4
Total.....	68	1	20	1	186	18	161	582	154	0	26	740
Corresponding week, 1945.....	42	-----	12	2	186	-----	171	-----	192	0	31	651
Average, 1941-45.....	41	-----	22	16	255	-----	219	-----	194	0	32	969

13-year average, 1943-45.

15-year median, 1941-45.

*Dysentery, amebic.*—Cases: New York 1; Newark 1; Philadelphia 1; Detroit 1; St. Louis 2; Los Angeles 3; San Francisco 1.

*Dysentery, bacillary.*—Cases: New York 1; Rochester 1; Detroit 1; Baltimore 1; Salt Lake City 1; Sacramento 4; San Francisco 7.

*Dysentery, unspecified.*—Cases: Baltimore 1; San Antonio 4.

*Leprosy.*—Cases: New Orleans 1.

*Rocky Mountain spotted fever.*—Cases: Philadelphia 1; Columbus 1; Richmond 1.

*Tularemia.*—Cases: Nashville 1.

*Typhus fever, endemic.*—Cases: New York 1; Savannah 2; Tampa 1; Mobile 2; New Orleans 18 (including monthly report from Charity Hospital); Houston 1; San Antonio 1.

*Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1945, 34,235,000)*

	Diphtheria case rates	Etiophthalmis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polymyellitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	5.3	0.0	0.0	2.6	81	5.3	23.6	31.5	45	0.0	5.3	257
Middle Atlantic.....	6.9	0.5	2.8	0.0	19	1.9	22.2	21.8	14	0.0	3.2	71
East North Central.....	9.6	0.0	1.2	0.0	28	2.1	15.4	34.0	24	0.0	3.2	224
West North Central.....	6.0	0.0	2.0	0.0	30	2.0	50.3	42.7	18	0.0	3.0	52
South Atlantic.....	8.2	0.0	8.2	0.0	42	4.9	18.0	18.0	28	0.0	3.0	82
East South Central.....	5.9	0.0	17.7	0.0	18	5.9	53.1	32.6	6	0.0	11.9	47
West South Central.....	20.2	0.0	4.0	0.0	0	0.0	52.6	56.0	14	0.0	2.9	32
Mountain.....	15.9	0.0	7.9	0.0	71	0.0	103.3	200.5	119	0.0	15.9	119
Pacific.....	33.2	0.0	1.6	0.0	24	3.2	4.7	113.9	33	0.0	0.0	25
Total.....	10.5	0.2	3.1	0.2	29	2.8	24.9	88.8	23	0.0	4.0	115

## PLAGUE INFECTION IN KERN COUNTY, CALIF.

Under date of Aug. 23, 1946, plague infection was reported proved in pools of fleas and lice from ground squirrels, *C. beecheyi*, taken in Kern County, Calif., as follows: 200 fleas from 27 ground squirrels shot 4 miles west and 2 miles south of Tehachapi; 40 lice from 6 ground squirrels shot 6 miles west and 2 miles south of Tehachapi; and 217 fleas from 18 ground squirrels shot 2 miles south of Cummings Valley School.

## TERRITORIES AND POSSESSIONS

## Virgin Islands of the United States

*Notifiable diseases—April—June 1946.*—During the months of April, May, and June 1946, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	April	May	June	Disease	April	May	June
Chickenpox.....	11	-----	-----	Sprue.....	-----	1	-----
Filariasis.....	9	2	2	Syphilis.....	9	16	10
Gonorrhea.....	15	15	19	Tuberculosis (respiratory).....	1	-----	-----
Hookworm disease.....	7	6	4	Typhus fever (murine).....	1	-----	-----
Schistosomiasis.....	-----	3	-----				

## FOREIGN REPORTS

### NORWAY

*Notifiable diseases—April 1946.*—During the month of April 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	24	Measles.....	679
Diphtheria.....	292	Mumps.....	155
Dysentery, unspecified.....	11	Paratyphoid fever.....	2
Encephalitis, epidemic.....	1	Pneumonia.....	2,536
Erysipelas.....	404	Poliomyelitis.....	17
Gastroenteritis.....	3,436	Rheumatic fever.....	209
Gonorrhea.....	702	Scabies.....	4,436
Hepatitis, epidemic.....	522	Scarlet fever.....	646
Impetigo contagiosa.....	2,891	Syphilis.....	123
Influenza.....	9,643	Tuberculosis (all forms).....	449
Lymphogranuloma inguinale.....	2	Typhoid fever.....	1
Malaria.....	1	Whooping cough.....	3,136

### CANADA

*Provinces—Communicable diseases—Week ended August 3, 1946.*—During the week ended August 3, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		15		29	118	5	16	28	53	264
Diphtheria.....		3			6	1			2	12
German measles.....				1	3			1	3	8
Influenza.....		4			1				5	10
Measles.....		3		105	73	38	46	72	20	357
Meningitis, meningococcus.....				2	2					4
Mumps.....				11	75	18	42	31	31	208
Poliomyelitis.....		2	1	40	24	2	1	4		74
Scarlet fever.....		1	2	23	24	2	3	4	1	60
Tuberculosis (all forms).....		8	22	100	49	25	12	10	30	256
Typhoid and paratyphoid fever.....			1	6	4		1		2	14
Undulant fever.....					1					1
Veneral diseases:										
Gonorrhea.....		22	10	124	131	44	45	59	64	499
Syphilis.....		11	5	91	94	8	11	14	36	270
Whooping cough.....		10		13	69	3		3		93

## CUBA

*Habana—Communicable diseases—4 weeks ended July 20, 1946.*—During the 4 weeks ended July 20, 1946, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox.....	2	-----	Poliomyelitis.....	14	1
Diphtheria.....	10	-----	Tuberculosis.....	4	5
Malaria.....	4	-----	Typhoid fever.....	44	6
Measles.....	20	-----			

*Provinces—Notifiable diseases—4 weeks ended July 13, 1946.*—During the 4 weeks ended July 13, 1946, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer.....	3	12	13	16	2	18	64
Chickenpox.....	-----	2	-----	-----	1	-----	3
Diphtheria.....	-----	13	2	2	1	2	20
Hookworm disease.....	-----	16	-----	-----	-----	1	17
Leprosy.....	-----	14	-----	-----	-----	3	17
Malaria.....	4	5	1	3	2	72	87
Measles.....	-----	18	-----	-----	3	-----	21
Poliomyelitis.....	14	24	4	10	7	3	62
Tuberculosis (respiratory).....	21	35	11	55	16	58	196
Typhoid fever.....	30	80	12	97	33	70	322
Typhus fever (murine).....	1	1	-----	-----	-----	2	4

† Includes the city of Habana.

## FINLAND

*Notifiable diseases—June 1946.*—During the month of June 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	10	Paratyphoid fever.....	262
Diphtheria.....	520	Poliomyelitis.....	17
Dysentery.....	10	Scarlet fever.....	171
Gonorrhea.....	1, 181	Syphilis.....	333
Malaria.....	25	Typhoid fever.....	38

## JAMAICA

*Notifiable diseases—4 weeks ended July 27, 1946.*—During the 4 weeks ended July 27, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis.....	1	1	Puerperal sepsis.....	-----	4
Chickenpox.....	4	9	Scarlet fever.....	-----	1
Diphtheria.....	2	3	Tuberculosis (pulmonary).....	28	55
Dysentery, unspecified.....	2	2	Typhoid fever.....	6	89
Erysipelas.....	1	2	Typhus fever (murine).....	5	-----
Leprosy.....	-----	1			

## NEW ZEALAND

*Notifiable diseases—4 weeks ended July 13, 1946.*—During the 4 weeks ended July 13, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis.....	1	-----	Pollomyelitis.....	8	1
Cerebrospinal meningitis.....	15	1	Puerperal fever.....	7	1
Diphtheria.....	298	10	Scarlet fever.....	125	-----
Dysentery:			Tetanus.....	4	1
Amebic.....	4	-----	Trachoma.....	5	-----
Bacillary.....	17	-----	Tuberculosis (all forms).....	184	45
Erysipelas.....	15	-----	Typhoid fever.....	8	1
Malaria.....	12	-----	Undulant fever.....	1	-----

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*China.*—Cholera has been reported in China as follows: Chekiang Province—July 1–10, 1946, 78 cases, 30 deaths including 73 cases with 29 deaths in Wenchow; July 11–20, 1946, 92 cases, 11 deaths; July 21–31, 1946, 68 cases; Fukien Province—July 11–20, 1946, 114 cases, 37 deaths including 112 cases with 36 deaths in Foochow; Kiangsu Province—July 11–20, 1946, 467 cases, 33 deaths including 75 cases with 2 deaths in Nanking, July 21–31, 1946, 199 cases, 3 deaths; Kwangtung Province—July 11–20, 1946, 60 cases, 12 deaths in Canton; July 21–31, 1946, 29 cases, 2 deaths, including 21 cases in Canton and 8 cases with 2 deaths in Swatow. During the month of June 1946, 136 cases of cholera were reported in the island of Formosa.

*Indochina (French)—Cambodia.*—During the month of July 1946, 109 cases of cholera were reported in Cambodia, French Indochina.

*Manchuria.*—For the period June 20 to July 31, 1946, 1,997 cases of cholera with 702 deaths were reported in Manchuria by Provinces as follows: Jehol, 7 cases; Kirin, 268 cases, 268 deaths; Liaoning, 1,025 cases, 434 deaths; Liaopeh, 697 cases.

#### Plague

*China.*—During the month of July 1946, 110 cases of plague with 28 deaths were reported in Fukien Province, China, including 45 cases with 4 deaths in Amoy and 60 cases with 23 deaths in Foochow. For the period June 21–30, 1946, 23 cases of plague with 14 deaths were reported in Kwangtung Province, China.

## Smallpox

*Indochina (French)—Cambodia.*—During the month of July 1946, 307 cases of smallpox were reported in Cambodia, French Indochina.

## Typhus Fever

*Ecuador.*—For the month of July 1946, 105 cases of typhus fever with 9 deaths were reported in Ecuador. Provinces reporting the highest incidence are: Chimborazo, 22 cases, 1 death; Pichincha, 17 cases, 1 death; Bolivar, 13 cases, 2 deaths; Tungurahua, 13 cases, 2 deaths.

*Morocco (French).*—For the period August 1-10, 1946, 37 cases of typhus fever were reported in French Morocco, including cases reported by regions as follows: Casablanca, 18; Marrakech, 8; Meknes, 8.







# FEDERAL SECURITY AGENCY

## United States Public Health Service

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

**VOLUME 61    SEPTEMBER 20, 1946    NUMBER 38**

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# Public Health Reports

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## THE HEALTH CENTER

### Adaptation of Physical Plants to Service Concepts <sup>1</sup>

By JOSEPH W. MOUNTIN, *Medical Director*, and AUGUST HOENACK, *Architect*,  
*United States Public Health Service*

Although the term "health center" may be regarded as a fairly recent increment to the public health lexicon, it has already acquired a variety of meanings. As originally conceived the health center was a physical structure for housing the health department and voluntary agencies operating in similar or allied fields of endeavor. Early in their development, health departments were preoccupied with law enforcement, and voluntary agencies with health promotion work. As one might expect, the few health centers of that period featured library and exhibit space, rooms for personal and group conferences, and the necessary office accommodations for administrative personnel. Later public health agencies were given additional responsibilities and these are reflected in health centers of more recent date. The acceptance of functions that involve physical examination and treatment of individuals necessitates incorporating into health center design and equipment many features ordinarily associated with a hospital out-patient department.

Venereal disease and tuberculosis control, also maternal and child health work, may be cited as services requiring laboratory equipment and clinic accommodations.

Formerly hospitals were concerned only with the care of patients while actually confined within the institutions. Gradually staff members are becoming more aware of their potential role in a broad health program. Now a feeling, quite prevalent among hospital and health authorities, is to the effect that resources of the hospital, as expressed by its staff organization, physical plant, and scientific

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<sup>1</sup> From States Relations Division.

equipment, should be made generously available to the surrounding community. In other words, services afforded should meet the needs of ambulatory as well as hospitalized persons who may require either physical appraisal or actual treatment for frank illness. It would therefore seem that a hospital so conceived and operated might well lay claim to the designation "health center."

With the extension of prepaid medical care plans, practicing physicians should be enabled to take a larger part in preventive health measures than is possible when they are compensated for their work only through fees collected directly from persons served. Already the slogan "every physician's office a health center" has attained wide usage. While this slogan may be a bit pretentious at present, nevertheless it can be indicative of a future trend. Where physicians are associated in groups which include several specialties of medicine, the possibilities for their participation in organized health programs are very much enhanced.

Each of the three foregoing service arrangements is susceptible to both internal and lateral expansion. That is, health departments may take on more clinical functions; hospitals may open their facilities to ambulatory patients; and, physicians in private practice may enlarge their preventive work. Each might operate quite independent of the other; although a preferable plan would be for programs to develop under arrangements that represent appropriate physical and functional combinations of available resources. Especially in smaller communities and in neighborhoods of larger metropolitan areas, a related system of service might be developed within a single building. Under circumstances less favorable for integration, some measure of unity in effort should be possible through joint program planning between agencies and by utilizing each other's resources on a cooperative basis. This article features types of physical accommodations that may be utilized under different circumstances for coordination of community health efforts; a discussion of administrative schemes required for implementing various functional concepts is reserved for another occasion.

From the standpoint of structure there are at least four patterns along which health centers may be developed.

- (a) Those designed exclusively for use by public health agencies.
- (b) Those that provide space for public health functions to be performed in the hospital.
- (c) Those that furnish accommodations for the health department and the practicing physicians.
- (d) Those that bring together in one building, or in a group of related buildings, the health department, the hospital, and offices for practicing physicians.

The illustrations used in this paper show how physical facilities may be developed to further the coordination of health functions in a

community. These are, however, only type plans which in most cases will need modification to meet local circumstances. Several factors may determine these circumstances, such as size and distribution of population, nature and extent of services to be performed, character of existing institutions, professional and community attitudes. Any of these factors might well make it necessary to revise the space relationships. Site conditions also will affect the final shape and dimensions of the building.

Among the major shortcomings of many existing health center facilities are inadequate parking space, insufficient room for expansion, and rigidity of structure. Choice of a sufficiently large site will solve the first two problems. Flexibility, which is the capacity of the plan to adapt itself to certain functional changes, must be designed into the building at the start. Changes in community health programs often necessitate alteration of health center space requirements. The use of light demountable partitions will readily permit simple revisions in the arrangement of space to accommodate for such changes. In small health centers flexibility also may be obtained by planning rooms to serve dual purposes, thus varied activities can be carried on in them at different hours.

When several distinct health organizations are housed together, the benefits of such a combination must be obtained without interfering with primary functions. This is achieved most readily in a one-story building by providing complete segregation in separate wings with direct entrances for health center clientele, private physicians' patients, and for staff members. Clinic rooms and physicians' offices are most convenient for patients when located on the ground floor; however, if patient areas are located on upper floors, elevators should be provided.

The traditional type of health center, and that best understood by the general public is illustrated by figure 1. Primarily it houses the health department. In such a building provision is made for discharge of functions common in orthodox public health programs. Work which is essentially administrative in character requires little more than ordinary office space. An activity closely allied with administration is that of popular health instruction. For its performance the health department needs suitable space to display pamphlets, posters, exhibit materials, and films, and for conducting demonstrations. On occasions people need to be assembled in a group, and to accommodate them a small auditorium is essential. Almost without exception health departments operate preventive clinics such as: immunization, maternity and child hygiene, also clinics for the diagnosis and treatment of venereal diseases and tuberculosis. Each of these clinics has its own set of requirements, although considerable interchange of facilities is possible and in the



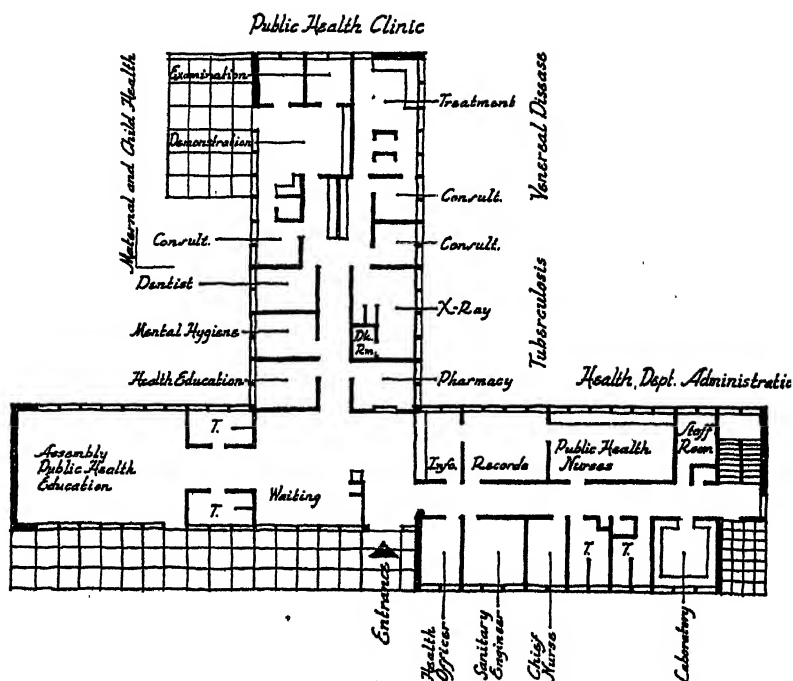


FIGURE 1.—Schematic plan for a health center designed to house the administrative and clinical functions of a small health department.

interest of economy. To complement these clinics and otherwise aid in the program of the health department, the laboratory is maintained. Where the health department has responsibilities in addition to those provided for in the accompanying figures, suitable alteration in building design or space arrangement would be indicated. Likewise the capacity or number of rooms may be increased or decreased depending on size of the population served. As stated previously, clinic and demonstration rooms may be used for a number of related purposes.

In rural sections and in large metropolitan areas it is not always practicable for the health department to conduct all of its operations from the headquarters building. Decentralization can be accomplished by development of neighborhood health centers. These may resemble the headquarters building except for size; likewise some accommodations may be omitted if corresponding services are not provided. On the other hand neighborhood centers can be very simple in design where only limited functions are discharged, but the great need is for extreme localization of effort. Accommodations of this latter type are illustrated in figure 2. Such a rudimentary center, of course, is quite incomplete in its provisions; consequently its usefulness is con-

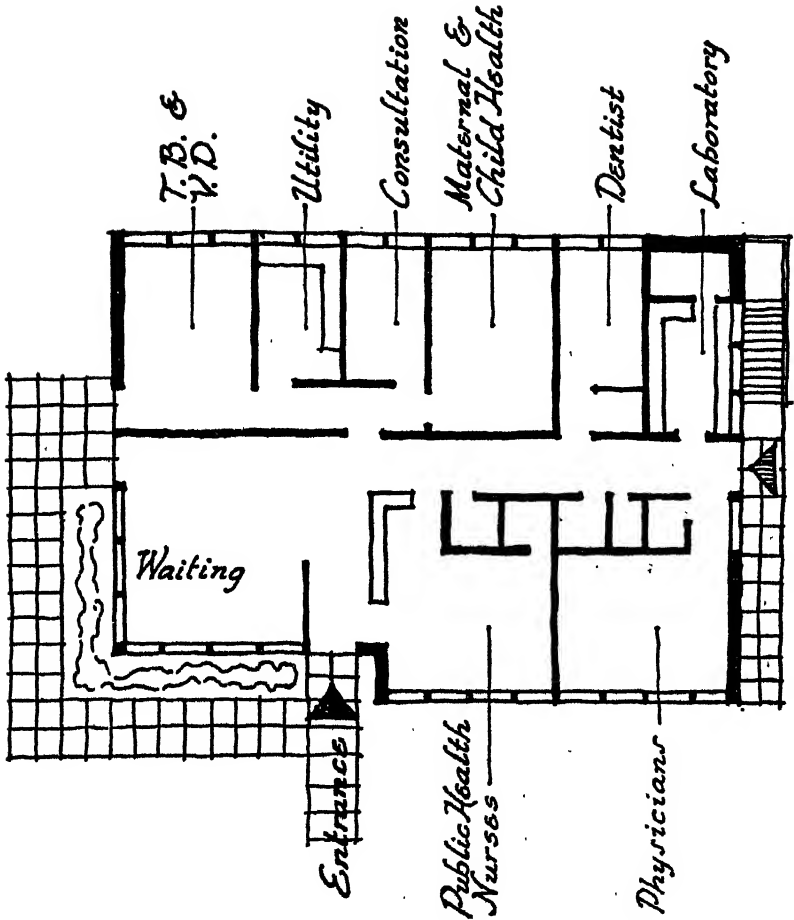


FIGURE 2.—Suggested plan for a neighborhood or rural sub-health center.

tingent in great measure on the existence of additional resources elsewhere which can be drawn upon as occasions demand.

A thought often expressed is that health centers in areas remote from general hospitals might be designed to include a few beds—perhaps eight or ten. Implicit in this idea is their use for ordinary emergencies and obstetrical cases. Irrespective of how inappropriate the facilities actually provided may be, there is likely to develop a strong urge to use them for purposes that should be carried out only in a good general hospital. Proposals for the inclusion of a few beds in outpost health centers therefore should not be adopted without due reflection on the responsibilities entailed. In a word, such responsibilities are little short of those attached to full hospitalization of patients. Quite another matter is the combination of a health center

with a general hospital of size sufficient for efficient operation and suitable staff organization.

In varying degrees joint housing of the hospital and the health department is both practicable and desirable. Where a community maintains only a single small public hospital and a correspondingly small health department, unity of structure, function, and management should be sought. Figure 3 represents a building designed for such an arrangement. In addition to housing the health department and providing service units to be used alike by bed and ambulatory

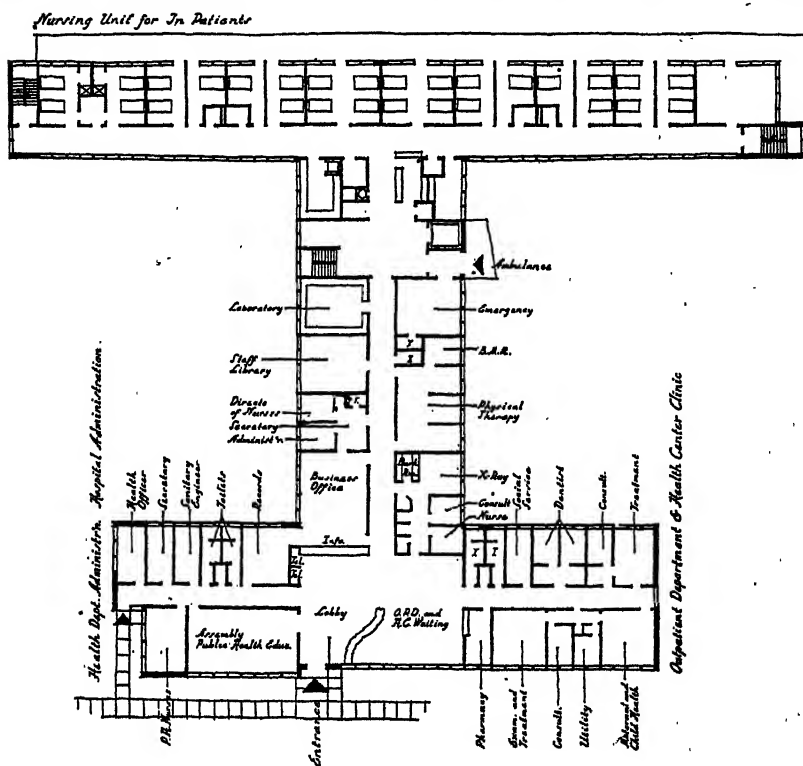


FIGURE 3.—First floor plan of a rural 40-bed hospital and health center with adjunct diagnostic facilities easily accessible to both in-patients and clinic patients.

patients, the building depicted has space for about 40 beds in the hospital section proper. This is believed to be about the minimum bed complement which is compatible with economical operation and a type of staff organization necessary to assure care of acceptable quality.

As a usual thing several hospitals, each operating under separate auspices, will be found in a single health jurisdiction. If the headquarters of the health department were to be accommodated by any one of the hospitals, an additional structure, very likely, would be

required. For reasons of policy, the health officer might not desire intimate association with a particular hospital to the exclusion of others, especially if he does not have administrative responsibility for its operation. A preferable arrangement for the health department is one whereby all hospitals make specified service contributions to the general health programs. Suitable physical accommodations further this scheme, since the essential purpose to be accomplished is making technological resources of hospitals available to the community at large. Units of any hospital particularly involved in such a relationship are radiology, physiotherapy, and laboratory. These units need to be placed so that they are readily accessible to ambulatory patients without causing disturbance to bed patients or otherwise interfering with necessary hospital routines. A point often overlooked is that patients coming to a hospital for service on a visit basis present requirements that differ in many respects from patients who are admitted for bed care. They should not be subjected to the usual admission routines. Their passage through the several diagnostic and treatment units also should be scheduled and expedited. Comfortable waiting space and dressing rooms represent essentials that are often skimmed even in new designs. If it is desirable for an existing hospital, designed originally to serve only bed patients, to meet the added requirements of general community service, it may be necessary to concentrate units for use alike by bed and ambulatory patients in a new section constructed especially for the purpose.

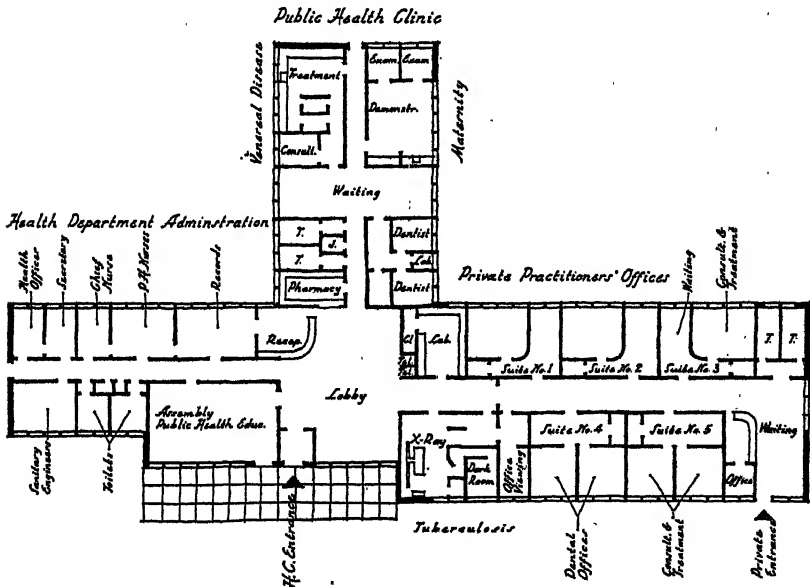
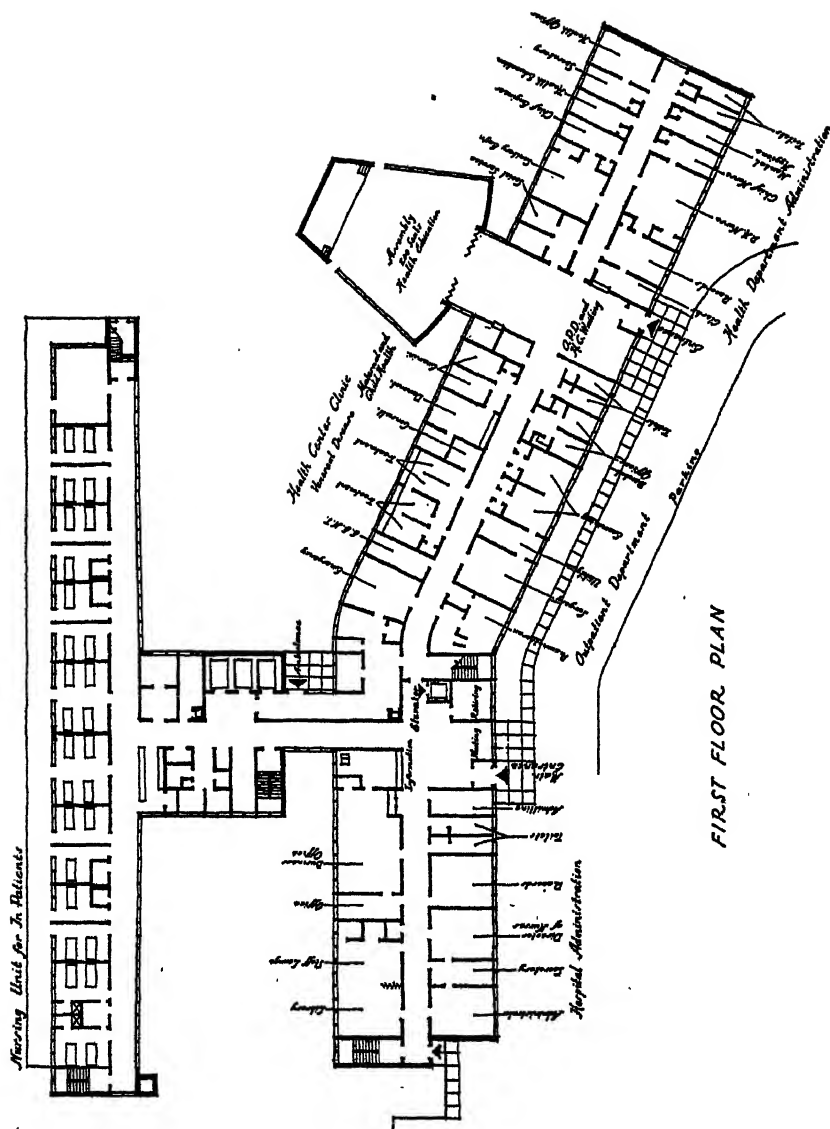


FIGURE 4.—An arrangement whereby private physicians and the health department have joint use of X-ray and laboratory equipment and yet occupy separate sections of the building.





Particularly in remote areas, where the establishment of a hospital is not contemplated at all or within the near future, improvement of both medical practice and public health organization should be promoted by pooling of local personnel and physical equipment. Accomplishment of this end often can be advanced by bringing personnel into that close association which is made possible by joint housing. Such a scheme is depicted in figure 4. Here space is arranged so that health department employees and practicing physicians may work together when occasions so indicate and yet each group occupies distinct sections of the building. The degree to which functions may be separated or, on the other hand, integrated, depends on the desires of occupants and needs of those who apply for service. In any case, combined use of laboratory, radiological, and other types of equipment together with technical personnel involved in their operation, is contemplated.

The fourth basic service plan mentioned earlier contemplates bringing together in physical as well as operating relationship the health department, the hospital, and the practicing physicians. Where the entire population of an area is tributary to a single community hospital, and all local physicians are represented on the staff, this arrangement should present no great difficulty from an administrative standpoint. Structurally the plan may be executed in a single building, especially if an entire new development is contemplated. Figure 5 should aid in visualizing such a unitary type of health center. Its capacity may be altered up or down depending on the size of the population to be served. If the service scheme must take into account a pre-existing hospital, then erecting additional buildings on the same or adjoining sites may be the only feasible arrangement. Even so, the hospital might require essential alterations so as to make selected units readily available for ambulatory patients.

Throughout this discussion emphasis has been placed on structural design with a view to facilitating operating relationships among occupants participating in the services afforded. This consideration, while of primary importance, should not be allowed to overshadow others of equal weight—especially general location and site characteristics. Unless it is necessary to relate new construction to existing buildings, health centers should always be placed so as to assure maximum accessibility to the population served. The site itself should be chosen with a view to beauty as well as utility. Not alone is ample space essential to those ends, but in no other way is it possible to provide for orderly expansion of accommodations.

The several types of plans set out in this paper for implementing a flexible health center concept should not be regarded as rigid from

either a structural or a functional standpoint. They are used more than anything else to illustrate methods by which community resources may be coordinated through the device of appropriate physical facilities. No one of them is specific for any particular locality. As a matter of fact, localities quite similar in most respects may choose different devices. The community should not be unduly critical if the type plan selected originally does not fulfill every expectation. Health organization is now passing through an evolutionary stage, and no person can be certain of its ultimate form. In the final analysis a health center, like any other physical structure, will be no more than an instrument for accomplishing a purpose. First of all, the purpose must be conceived as clearly as possible, and second, those who are responsible for its execution must exercise that degree of patience and persistence which always is required in the conduct of delicate human relationships.

## SEROLOGICAL RELATIONSHIPS IN THE EPIDEMIC-ENDEMIC TYPHUS GROUP AS DETERMINED BY COMPLEMENT FIXATION<sup>1</sup>

By IDA A. BENGTSON, *Senior Bacteriologist, United States Public Health Service*

During the course of the recent war, opportunity was afforded to collect a considerable number of strains of epidemic typhus fever in connection with vaccine studies. Also on hand was the Breinl strain which had been maintained by guinea pig passage at the National Institute of Health for a number of years. Three endemic typhus strains were available for study, including the Wilmington strain which had also been maintained in guinea pigs at the National Institute of Health. The strains included in this study of serological relationships in the epidemic-endemic typhus group are the following:

### ***Epidemic Typhus***

Breinl strain obtained from Dr. F. Breinl in Prague by Dr. K. F. Maxcy, in 1928. (Strains M 1 and M 4, isolated in the Madrid epidemic of 1941. (Received from Maj. J. C. Snyder, M.C., A.U.S., of the United States of America Typhus Commission.)

Strains MBL and MBB, isolated in the typhus outbreak in Barcelona, Spain, 1941. (Received from Dr. H. Mooser.)

Strain P, isolated from a typical case of exanthematic typhus. (Received from Dr. L. Patino-Camargo of Bogota, Colombia, in February 1942.)

Cairo strain, isolated from a case of epidemic typhus in Cairo, Egypt. (Received from Dr. C. H. Andrews, National Institute for Medical Research, London, England, in 1942.)

<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health.



Nine strains, obtained in July 1943 through the United States of America Typhus Commission, in the form of frozen guinea pig brains as follows:

*Egyptian strains:*

F. H. 2667.	Blood isolation.....	Second passage in guinea pigs.
F. H. 3023.	Blood isolation.....	Third passage in guinea pigs.
F. H. 3930.	Blood isolation.....	Second passage in guinea pigs.
F. H. 3558.	Blood isolation.....	Second passage in guinea pigs.
F. H. 5038.	Blood isolation.....	First passage in guinea pigs.

*Nit Raheina (Egypt):*

Zeinab....	Louse isolation.....	Sixth passage in guinea pigs.
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*Teheran strains:*

Pt. 27.....	Blood isolation.....	Fourth passage in guinea pigs.
Pt. 3.....	Louse isolation.....	Fourth passage in guinea pigs.

*Algiers strain:*

Algiers No. 4	Louse isolation.....	Second passage in guinea pigs.
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**Endemic Typhus**

Wilmington strain, isolated from a case of endemic typhus fever in Wilmington, N. C., by Dr. K. F. Maxcy, in 1928.

Brigham strain (R2451-15), isolated from wild rats by Dr. George D. Brigham in 1941, at Savannah, Ga.

W. R. strain, isolated from a wild rat by Dr. N. H. Topping in 1941, at Washington, D. C.

All strains were cultivated in the yolk sac of chick embryos and antigens prepared as discussed below. Complement-fixation tests were performed as has been previously described (1). Fixation was carried out in the 37° C. water bath for 1 hour, and readings were made the following morning after the test had been kept at cold-room temperature overnight. Two full units of complement were employed in the test.

The serums employed were obtained from recovered guinea pigs used in the maintenance of the various virus strains. The animals were bled from the heart 2 to 3 weeks after fever had subsided. The clear serum without preservative was transferred in 5-cc. amounts to ampules and lyophilized, the dry serum being restored to the original volume with distilled water at the time of use.

Antigens were prepared from infected yolk sacs according to the method of Craigie (2) with certain modifications. Ten-percent suspensions of heavily infected yolk sacs were prepared by grinding in a Waring Blendor with 0.85 percent saline containing 0.01 percent merthiolate. After standing overnight the suspension was shaken with an equal volume of diethyl ether in a separatory funnel. The aqueous layer which forms contains both rickettsiae and soluble antigen (3), most of the tissue collecting in an interface between the aqueous layer and the clear ether layer above. The aqueous layer was usually relatively clear. Further purification was effected by one or

more additional treatments with ether, depending upon the turbidity, and occasionally by filtration through filter-cel, these processes serving to remove more tissue. The final product was practically water clear and usually showed only a slight tinge of color.

The method employed to determine the serological relationship of the various strains was the following: An epidemic typhus serum (Breinl strain) of moderately high titer was employed in the titration of the various epidemic typhus antigens. A fixed dilution of serum 1:16 was tested against varying dilutions of the antigens. An endemic typhus serum (Wilmington strain) was likewise used in the titration of endemic typhus antigens. The titer or antigenic unit of each antigen was considered to be the highest dilution in which complete fixation occurred. All serums tested were then titrated against a fixed amount of each antigen, which was four times the antigenic unit. In the tests carried out, 10 epidemic typhus antigens and 3 endemic typhus antigens were employed. Twelve epidemic typhus serums and 2 endemic typhus serums were tested. The results of these tests are shown in tables 1 and 2. Table 2 is a continuation of table 1, but in table 2 a greater number of serums were tested against fewer antigens.

TABLE 1.—*Titration of epidemic and endemic typhus serums by complement fixation*

Serum	Antigen	Dilution of antigen	Titer of serums:					
			1:16	1:32	1:64	1:128	1:256	1:512
Breinl strain (epidemic typhus).	Endemic typhus T 51 (Wilmington).	1:32	-----	4	1	-----	-----	-----
	Endemic typhus T 62 (Wilmington).	1:64	-----	4	1	-----	-----	-----
	Endemic typhus T 57 (Brigham).	1:16	-----	4	4	-----	-----	-----
	Endemic typhus T 73 (Brigham).	1:64	-----	4	1	-----	-----	-----
	Endemic typhus T 75 (Wild rat).	1:64	-----	4	2	-----	-----	-----
	Epidemic typhus ET 171 (Breinl).	1:32	-----	-----	-----	4	1	0
	Epidemic typhus ET 208 (Breinl).	1:128	-----	-----	-----	4	1	0
	Epidemic typhus ET 203 (MBB).	1:64	-----	-----	-----	4	0	0
	Epidemic typhus ET 206 (MBB).	1:128	-----	-----	-----	4	0	0
	Epidemic typhus ET 169 (MBL).	1:4	-----	-----	-----	4	0	0
	Epidemic typhus ET 186 (MBL).	1:16	-----	-----	-----	4	0	0
	Epidemic typhus ET 202 (M1).	1:64	-----	-----	-----	4	1	0
	Epidemic typhus ET 205 (M1).	1:32	-----	-----	-----	4	1	0
	Epidemic typhus ET 189 (M4).	1:128	-----	-----	-----	4	1	0
	Epidemic typhus ET 215 (M4).	1:128	-----	-----	-----	4	0	0
	Epidemic typhus ET 170 (P).	1:8	-----	-----	-----	4	1	0
	Epidemic typhus ET 204 (P).	1:128	-----	-----	-----	4	1	0
	Epidemic typhus ET 185 (Calro).	1:32	-----	-----	-----	4	Trace	0
	Epidemic typhus ET 196 (Calro).	1:64	-----	-----	-----	4	Trace	0

TABLE 1.—*Titration of epidemic and endemic typhus serums by complement fixation—Continued*

Serum	Antigen	Dilution of antigen	Titer of serums:					
			1:16	1:32	1:64	1:128	1:256	1:512
MBL strain (epidemic typhus).	Endemic typhus T 51 (Wilmington).	1:32	4	4	0	---	---	---
	Endemic typhus T 62 (Wilmington).	1:64	4	2	0	---	---	---
	Endemic typhus T 57 (Brigham).	1:16	4	4	1	---	---	---
	Endemic typhus T 73 (Brigham).	1:64	4	4	0	---	---	---
	Endemic typhus T 75 (Wild rat).	1:64	4	4	0	---	---	---
	Epidemic typhus ET 171 (Breinl).	1:32	---	---	4	4	1	---
	Epidemic typhus ET 208 (Breinl).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 203 (MBB).	1:64	---	---	4	4	0	---
	Epidemic typhus ET 206 (MBB).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 189 (MBL).	1:4	---	---	4	4	0	---
	Epidemic typhus ET 186 (MBL).	1:16	---	---	4	4	0	---
	Epidemic typhus ET 201 (M1).	1:64	---	---	4	4	Trace	---
	Epidemic typhus ET 205 (M1).	1:32	---	---	4	4	1	---
	Epidemic typhus ET 189 (M4).	1:128	---	---	4	4	1	---
	Epidemic typhus ET 215 (M4).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 170 (P).	1:8	---	---	4	4	Trace	---
	Epidemic typhus ET 204 (P).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 185 (Cairo).	1:32	---	---	4	4	0	---
	Epidemic typhus ET 196 (Cairo).	1:64	---	---	4	4	0	---
MBB strain (epidemic typhus).	Endemic typhus T 51 (Wilmington).	1:32	4	4	0	---	---	---
	Endemic typhus T 62 (Wilmington).	1:64	4	2	0	---	---	---
	Endemic typhus T 57 (Brigham).	1:16	4	4	Trace	---	---	---
	Endemic typhus T 73 (Brigham).	1:64	4	4	Trace	---	---	---
	Endemic typhus T 75 (Wild rat).	1:64	4	4	0	---	---	---
	Epidemic typhus ET 171 (Breinl).	1:32	---	---	4	4	Trace	---
	Epidemic typhus ET 208 (Breinl).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 203 (MBB).	1:64	---	---	4	4	0	---
	Epidemic typhus ET 206 (MBB).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 189 (MBL).	1:4	---	---	4	4	0	---
	Epidemic typhus ET 186 (MBL).	1:16	---	---	4	4	0	---
	Epidemic typhus ET 202 (M1).	1:64	---	---	4	4	Trace	---
	Epidemic typhus ET 205 (M1).	1:32	---	---	4	4	1	---
	Epidemic typhus ET 189 (M4).	1:128	---	---	4	4	1	---
	Epidemic typhus ET 215 (M4).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 170 (P).	1:8	---	---	4	4	Trace	---
	Epidemic typhus ET 204 (P).	1:128	---	---	4	4	0	---
	Epidemic typhus ET 185 (Cairo).	1:32	---	---	4	4	0	---
	Epidemic typhus ET 196 (Cairo).	1:64	---	---	4	4	0	---

TABLE 1.—*Titration of epidemic and endemic typhus serums by complement fixation—Continued*

Serum	Antigen	Dilution of antigen	Titer of serums:					
			1:16	1:32	1:64	1:128	1:256	1:512
Brigham strain (endemic typhus).	Endemic typhus T 51 (Wilmington).	1:32	---	---	---	4	Trace	---
	Endemic typhus T 62 (Wilmington).	1:64	---	---	---	4	1	---
	Endemic typhus T 57 (Brigham).	1:16	---	---	---	4	1	---
	Endemic typhus T 73 (Brigham).	1:64	---	---	---	4	1	---
	Endemic typhus T 75 (Wild rat).	1:64	---	---	---	4	3	---
	Epidemic typhus ET 171 (Breinl).	1:32	---	4	4	1	---	---
	Epidemic typhus ET 208 (Breinl).	1:128	---	4	4	1	---	---
	Epidemic typhus ET 203 (MBB).	1:64	---	4	4	0	---	---
	Epidemic typhus ET 206 (MBB).	1:128	---	4	2	0	---	---
	Epidemic typhus ET 189 (MBL).	1:4	---	4	4	0	---	---
	Epidemic typhus ET 186 (MBL).	1:16	---	4	4	0	---	---
	Epidemic typhus ET 201 (M1).	1:64	---	4	4	0	---	---
	Epidemic typhus ET 205 (M1).	1:32	---	4	4	0	---	---
	Epidemic typhus ET 189 (M4).	1:128	---	4	4	0	---	---
	Epidemic typhus ET 215 (M4).	1:128	---	4	1	0	---	---
	Epidemic typhus ET 170 (P).	1:8	---	4	4	0	---	---
	Epidemic typhus ET 204 (P).	1:128	---	4	3	0	---	---
	Epidemic typhus ET 185 (Cairo).	1:32	---	4	4	0	---	---
	Epidemic typhus ET 196 (Cairo).	1:64	---	4	3	0	---	---
Wilmington strain (endemic typhus).	Endemic typhus T 51 (Wilmington).	1:32	---	---	---	4	4	0
	Endemic typhus T 62 (Wilmington).	1:64	---	---	---	4	4	0
	Endemic typhus T 57 (Brigham).	1:16	---	---	---	4	4	Trace
	Endemic typhus T 73 (Brigham).	1:64	---	---	---	4	4	1
	Endemic typhus T 75 (Wild rat).	1:32	---	---	---	4	3	0
	Epidemic typhus ET 171 (Breinl).	1:32	---	---	4	1	Trace	---
	Epidemic typhus ET 208 (Breinl).	1:128	---	---	4	3	0	---
	Epidemic typhus ET 203 (MBB).	1:64	---	---	4	4	0	---
	Epidemic typhus ET 206 (MBB).	1:128	---	---	4	1	0	---
	Epidemic typhus ET 189 (MBL).	1:4	---	---	4	4	0	---
	Epidemic typhus ET 186 (MBL).	1:16	---	---	4	1	0	---
	Epidemic typhus ET 201 (M1).	1:64	---	---	4	4	0	---
	Epidemic typhus ET 205 (M1).	1:32	---	---	4	4	Trace	---
	Epidemic typhus ET 189 (M4).	1:128	---	---	4	2	0	---
	Epidemic typhus ET 215 (M4).	1:128	---	---	4	Trace	0	---
	Epidemic typhus ET 170 (P).	1:8	---	---	4	4	1	---
	Epidemic typhus ET 204 (P).	1:128	---	---	4	1	0	---
	Epidemic typhus ET 185 (Cairo).	1:32	---	---	4	4	0	---
	Epidemic typhus ET 196 (Cairo).	1:64	---	---	4	1	0	---

TABLE 2.—*Titration of epidemic typhus serums by complement fixation*

Serum	Antigen	Dilution of antigen	Titer of serum:						
			1:16	1:32	1:64	1:128	1:256	1:512	1:1,024
F. H. 5038 strain (epidemic typhus).	Endemic typhus T 94 (Wilmington).	1:64	---	4	4	Trace	---	---	---
	Epidemic typhus ET 283 (Breinl).	1:32	---	---	---	---	---	4	4
	Epidemic typhus ET 218 (Zainab).	1:16	---	---	---	---	---	4	2
	Epidemic typhus ET 219 (F. H. 2667).	1:128	---	---	---	---	---	4	4
	Epidemic typhus ET 220 (F. H. 5038).	1:128	---	---	---	---	---	4	0
	---	---	---	---	---	---	---	---	---
F. H. 2667 strain (epidemic typhus).	Endemic typhus T 94.	1:64	4	4	1	---	---	---	---
	Epidemic typhus ET 283.	1:32	---	---	---	---	4	2	0
	Epidemic typhus ET 218.	1:16	---	---	---	---	4	4	0
	Epidemic typhus ET 219.	1:128	---	---	---	---	4	4	0
	Epidemic typhus ET 220.	1:128	---	---	---	---	4	2	0
	---	---	---	---	---	---	---	---	---
F. H. 3930 strain (epidemic typhus).	Endemic typhus T 94.	1:64	---	---	4	2	1	---	---
	Epidemic typhus ET 283.	1:32	---	---	---	---	4	1	0
	Epidemic typhus ET 218.	1:16	---	---	---	---	4	4	Trace
	Epidemic typhus ET 219.	1:128	---	---	---	---	4	4	Trace
	Epidemic typhus ET 220.	1:128	---	---	---	---	4	1	0
	---	---	---	---	---	---	---	---	---
F. H. 3023 strain (epidemic typhus).	Endemic typhus T 94.	1:64	---	---	4	1	Trace	---	---
	Epidemic typhus ET 283.	1:32	---	---	---	---	4	4	0
	Epidemic typhus ET 218.	1:16	---	---	---	---	4	4	Trace
	Epidemic typhus ET 219.	1:128	---	---	---	---	4	4	3
	Epidemic typhus ET 220.	1:128	---	---	---	---	4	2	Trace
	---	---	---	---	---	---	---	---	---
F. H. 3558 strain (epidemic typhus).	Endemic typhus T 94.	1:64	---	4	Trace	0	---	---	---
	Epidemic typhus ET 283.	1:32	---	---	---	---	4	1	0
	Epidemic typhus ET 218.	1:16	---	---	---	---	4	3	0
	Epidemic typhus ET 219.	1:128	---	---	---	---	4	2	0
	Epidemic typhus ET 220.	1:128	---	---	---	---	4	1	0
	---	---	---	---	---	---	---	---	---
Algiers No. 4 strain (epidemic typhus).	Endemic typhus T 94.	1:64	---	4	Trace	0	---	---	---
	Epidemic typhus ET 283.	1:32	---	---	---	---	4	1	0
	Epidemic typhus ET 218.	1:16	---	---	---	---	4	3	Trace
	Epidemic typhus ET 219.	1:128	---	---	---	---	4	4	Trace
	Epidemic typhus ET 220.	1:128	---	---	---	---	4	2	0
	---	---	---	---	---	---	---	---	---
Teheran Pt. 3 strain (epidemic typhus).	Endemic typhus T 94.	1:64	---	4	4	0	---	---	---
	Epidemic typhus ET 283.	1:32	---	---	---	---	4	4	1
	Epidemic typhus ET 218.	1:16	---	---	---	---	4	4	4
	Epidemic typhus ET 219.	1:128	---	---	---	---	4	4	4
	Epidemic typhus ET 220.	1:128	---	---	---	---	4	4	Trace
	---	---	---	---	---	---	---	---	---
Teheran Pt. 27 strain (epidemic typhus).	Endemic typhus T 94.	1:64	---	4	2	0	---	---	---
	Epidemic typhus ET 283.	1:32	---	---	---	---	4	4	Trace
	Epidemic typhus ET 218.	1:16	---	---	---	---	4	3	Trace
	Epidemic typhus ET 219.	1:128	---	---	---	---	4	4	1
	Epidemic typhus ET 220.	1:128	---	---	---	---	4	4	0
	---	---	---	---	---	---	---	---	---
Zainab strain (epidemic typhus).	Endemic typhus T 94.	1:64	4	Trace	0	---	---	---	---
	Epidemic typhus ET 283.	1:32	---	---	4	1	0	---	---
	Epidemic typhus ET 218.	1:16	---	---	4	1	0	---	---
	Epidemic typhus ET 219.	1:128	---	---	4	3	0	---	---
	Epidemic typhus ET 220.	1:128	---	---	4	1	0	---	---
	---	---	---	---	---	---	---	---	---

## DISCUSSION

Complement-fixation results show very marked uniformity among all the epidemic typhus strains and likewise among the endemic typhus strains tested. This confirms earlier work on three strains of epidemic typhus and one strain of endemic typhus (4). The titer of the Breinl serum in table 1 was uniformly 1:128 against the epidemic typhus antigens prepared from seven different strains of epidemic

typhus. The titer of this serum was 1:32 against three strains of endemic typhus except in the case of one antigen (T57) in which nearly complete fixation was obtained in the dilution 1:64. Similar results are evident with the MBL and MBB serums. The Brigham endemic typhus serum had a titer of 1:128 against three endemic typhus antigens and titers of 1:32 and 1:64 against all epidemic typhus strains. The Wilmington serum had a titer of 1:256 against the endemic typhus strains and 1:64 or 1:128 against epidemic typhus strains. In table 2, nine epidemic typhus serums were tested against four epidemic typhus antigens and one endemic typhus antigen. With a few exceptions, uniform results were obtained in the titration of each serum against the different epidemic typhus antigens. The titer against the endemic typhus antigen was two or three dilutions lower.

The results obtained point to serological similarity among the 17 strains of epidemic typhus, and also among the 3 strains of endemic typhus studied. Epidemic typhus guinea pig serums fixed complement in two or more twofold dilutions higher against epidemic typhus antigens than against endemic typhus antigens. Endemic typhus guinea pig serums fixed complement in one and sometimes two twofold dilutions higher against endemic typhus than against epidemic typhus antigens.

#### SUMMARY

In a serological study of 16 strains of epidemic typhus and 3 strains of endemic typhus by complement-fixation tests, in which titrations of guinea pig immune serums were made against suitable predetermined dilutions of antigen, it has been shown that serological homogeneity exists among all of the epidemic typhus strains and also among the 3 endemic typhus strains tested. Though a common antigenic factor is present, differentiation between epidemic and endemic typhus is indicated by higher titers against the homologous strain than against the heterologous strain.

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- (1) Bengtson, Ida A.: Complement fixation in the rickettsial diseases: Technique of the test. Pub. Health Rep., 59: 402-405 (1944).
- (2) Craigie, James.: Application and control of ethyl ether-water interface effects to the separation of rickettsiae from yolk sac suspensions. Confidential communication to National Institute of Health. (Feb. 10, 1942.)
- (3) Topping, N. H., and Shear, M. J.: Studies of antigens in infected yolk sacs. Pub. Health Rep., 59: 1671-1675 (1944).
- (4) Topping, N. H.; Bengtson, Ida A.; and Henderson, R. G.: Epidemic typhus fever: A study of the antigenicity of various strains of typhus virus. Nat. Inst. of Health. Bull. No. 183: Govt. Print. Off., 1945, pp. 57-84.

## CHANGES IN STATE AND TERRITORIAL HEALTH AUTHORITIES

**Change No. 1 to Directory of State and Territorial Health Authorities (Supplement No. 180 to the Public Health Reports—1945 Revision)**

Listed below are all changes of which notice has been received since the compilation of the 1945 revision. Further changes will be published monthly, as received. The editor will appreciate notification of any changes not listed herein, as well as of those which occur in the future.

### *Arizona State Department of Health*

Tuberculosis control:

**A. B. Kurlander, M. D.,** director

Division of Tuberculosis Control.

### *Louisiana State Department of Health*

Administration, general:

**Waldo Louis Treutling, M. D., M. P. H.,** State health officer.

### *Massachusetts Department of Public Health*

Communicable disease control, general:

**Roy F. Feemster, M. D., D. P. H.,** director

Division of Communicable Diseases.

Crippled children's services:

**Otto C. Yens, M. D.,** supervisor, crippled children's clinics

Division of Maternal and Child Health.

Laboratory services:

Bacteriological laboratories—

**Roy F. Feemster, M. D., D. P. H.,** director

Division of Communicable Diseases.

Local health administration:

**John J. Poutas, M. D., M. P. H.,** director

Division of Local Health Administration.

### *Nevada State Department of Health*

Administration, general:

**Fred S. Loe, M. D.,** State health officer.

### *New York State Department of Health*

Administration, general:

Personnel administration—

**Richard Mattox,** senior personnel administrator.

Venereal disease control:

**William A. Brumfield,** director

Division of Syphilis Control.

**Pennsylvania State Department of Health**

Communicable disease control, general:

**Ira C. Miller, M. D.**, acting chief

Division of Epidemiology.

Crippled children's services:

**W. C. Edwards**, chief

Division of Crippled Children.

Laboratory services:

**Claude P. Brown, M. D.**, chief

Division of Laboratories.

Tuberculosis control:

**Dale C. Stahle, M. D.**, acting director

Bureau of Tuberculosis Control.

**DEATHS DURING WEEK ENDED AUG. 24, 1946**

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 24, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	8,091	8,557
Average for 3 prior years.....	7,963	
Total deaths, first 34 weeks of year.....	313,143	308,436
Deaths under 1 year of age.....	777	617
Average for 3 prior years.....	628	
Deaths under 1 year of age, first 34 weeks of year.....	21,585	20,573
<b>Data from industrial insurance companies:</b>		
Policies in force.....	66,986,013	67,388,970
Number of death claims.....	9,925	12,857
Death claims per 1,000 policies in force, annual rate.....	7.7	9.9
Death claims per 1,000 policies, first 34 weeks of year, annual rate.....	9.8	10.4



# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED AUGUST 31, 1946

#### Summary

For the second consecutive week a slight decrease was recorded in the incidence of poliomyelitis. A total of 1,780 cases was reported, as compared with 1,806 last week, 1,814 for the next earlier week, 1,682 for the corresponding week in 1944, and a 5-year (1941-45) median of 917. Increases were reported in the East North Central area (422 to 542), Mountain area (126 to 131), and Pacific area (238 to 261). Reporting 5 or more cases currently, 17 States showed an increase (752 to 979), while 22 States reported a decrease (1,024 to 772). Virginia and New Mexico reported the same numbers for both weeks (5 and 11 respectively). The 28 States reporting currently 14 or more cases are as follows (last week's figures in parentheses): *Increases*—Massachusetts 18 (17), New Jersey 21 (16), Indiana 27 (20), Illinois 201 (183), Michigan 87 (76), Wisconsin 184 (95), North Dakota 74 (40), Nebraska 51 (29), Alabama 24 (21), Oklahoma 14 (13), Idaho 14 (12), Oregon 15 (12), California 218 (195); *decreases*—New York 89 (105), Pennsylvania 14 (16), Ohio 43 (48), Minnesota 208 (263), Iowa 24 (43), Missouri 63 (95), South Dakota 22 (74), Kansas 48 (60), Tennessee 18 (19), Mississippi 20 (22), Arkansas 23 (35), Louisiana 16 (21), Texas 23 (34), Colorado 77 (78), Washington 28 (31).

The cumulative total is 12,429, as compared with 9,474 for the same period in 1944 and a 5-year median of 5,886.

Of the total of 193 cases of diphtheria (as compared with 239 last week and a 5-year median of 245), California reported 14, Maryland 13, New York, Texas, and Washington 11 each, and Mississippi 10. The cumulative total is 10,334, as compared with 8,894 for the same period last year and a 5-year median of 7,871.

Of 28 cases of Rocky Mountain spotted fever reported for the week (last week 32 and a 5-year median 14) 24 occurred east of the Mississippi River, 15 in South Atlantic States. The total to date is 476, as compared with 386 for the same period last year and a 5-year median of 389.

A total of 7,918 deaths was recorded for the week in 93 large cities of the United States, as compared with 8,091 last week, 8,549 and 7,610, respectively, for the corresponding weeks in 1945 and 1944, and a 3-year (1943-45) average of 8,032. The total to date is 321,066, as compared with 316,985 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Aug. 31, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941- 45	Week ended—		Median 1941- 45	Week ended—		Median 1941- 45	Week ended—		Median 1941- 45
	Aug. 31, 1946	Sept. 1, 1945		Aug. 31, 1946	Sept. 1, 1945		Aug. 31, 1946	Sept. 1, 1945		Aug. 31, 1946	Sept. 1, 1945	
NEW ENGLAND												
Maine.....	2	0	0	—	—	—	7	1	11	1	0	0
New Hampshire.....	0	0	0	—	—	—	1	—	—	0	0	0
Vermont.....	1	0	0	—	—	—	15	14	4	0	0	0
Massachusetts.....	6	3	1	—	—	—	35	46	38	1	2	2
Rhode Island.....	0	0	0	1	—	—	12	—	3	0	0	0
Connecticut.....	1	0	0	—	—	—	16	11	11	0	3	3
MIDDLE ATLANTIC												
New York.....	11	13	10	15	12	12	73	24	50	4	2	8
New Jersey.....	5	2	2	1	—	2	29	12	12	1	3	1
Pennsylvania.....	7	10	7	—	3	1	49	27	27	2	12	11
EAST NORTH CENTRAL												
Ohio.....	4	4	4	—	—	5	58	7	24	5	2	2
Indiana.....	2	4	8	—	3	3	1	2	2	0	1	1
Illinois.....	7	1	5	—	1	2	14	128	10	1	3	3
Michigan <sup>1</sup> .....	6	7	6	6	—	1	28	24	16	2	5	5
Wisconsin.....	3	3	2	11	13	11	51	17	43	0	1	1
WEST NORTH CENTRAL												
Minnesota.....	7	7	2	—	—	—	5	2	3	0	1	1
Iowa.....	1	3	2	—	—	—	4	—	3	3	0	0
Missouri.....	3	2	2	—	2	1	1	3	4	3	0	3
North Dakota.....	2	0	1	—	8	5	1	1	3	1	0	0
South Dakota.....	1	3	3	—	—	—	—	2	3	0	0	0
Nebraska.....	2	0	1	—	1	—	4	1	1	1	0	0
Kansas.....	6	8	5	3	—	—	3	13	8	0	1	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	1	3	—	1	0	0
Maryland <sup>1</sup> .....	13	6	3	4	—	1	33	3	9	4	0	0
District of Columbia.....	0	0	0	—	—	—	2	—	1	4	0	0
Virginia.....	4	5	5	82	83	30	7	4	4	1	0	1
West Virginia.....	2	8	5	—	—	—	3	—	2	0	1	2
North Carolina.....	9	34	32	—	—	—	15	4	10	2	1	2
South Carolina.....	1	10	10	86	143	64	7	4	4	0	2	1
Georgia.....	3	9	12	2	—	18	4	1	7	0	0	0
Florida.....	4	6	6	—	2	3	4	1	4	1	2	2
EAST SOUTH CENTRAL												
Kentucky.....	6	7	7	—	—	1	1	4	4	0	1	1
Tennessee.....	6	8	8	108	5	5	6	5	3	2	2	1
Alabama.....	8	18	18	13	1	12	7	—	5	3	1	1
Mississippi <sup>1</sup> .....	10	13	11	—	—	—	—	—	—	0	0	0
WEST SOUTH CENTRAL												
Arkansas.....	8	11	7	4	47	2	—	7	6	1	2	1
Louisiana.....	2	4	2	—	5	1	—	1	1	0	0	1
Oklahoma.....	0	5	5	1	3	6	2	5	5	0	0	0
Texas.....	11	41	20	254	285	226	29	22	28	4	4	2
MOUNTAIN												
Montana.....	0	2	2	—	3	—	14	24	10	0	0	0
Idaho.....	1	3	0	12	6	3	3	20	3	0	0	0
Wyoming.....	1	0	0	—	—	—	5	1	1	0	0	0
Colorado.....	1	1	3	1	4	11	5	5	5	1	2	0
New Mexico.....	0	2	1	2	—	—	1	2	2	0	0	0
Arizona.....	1	2	1	17	12	28	9	—	4	1	0	0
Utah <sup>1</sup> .....	0	0	0	—	—	1	64	43	7	0	0	0
Nevada.....	0	0	0	—	—	—	—	—	—	0	0	0
PACIFIC												
Washington.....	11	2	2	—	—	—	2	30	30	0	2	2
Oregon.....	0	3	1	—	3	3	11	9	16	0	1	1
California.....	14	15	15	4	10	16	64	129	90	6	4	4
Total.....	193	284	245	617	649	524	706	662	668	56	61	61
35 weeks.....	10,334	8,894	7,871	193,041	72,810	82,813	640,085	102,559	539,145	4,568	6,825	6,829

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Aug. 31, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>2</sup>		
	Week ended—		Med-ian, 1941-45	Week ended—		Med-ian, 1941-45	Week ended—		Med-ian, 1941-45	Week ended—		Med-ian, 1941-45
	Aug. 31, 1946	Sept. 1, 1945		Aug. 31, 1946	Sept. 1, 1945		Aug. 31, 1946	Sept. 1, 1945		Aug. 31, 1946	Sept. 1, 1945	
NEW ENGLAND												
Maine.....	4	3	1	10	5	5	0	0	0	0	1	1
New Hampshire.....	7	3	2	0	9	2	0	0	0	1	0	0
Vermont.....	0	5	3	3	0	1	0	0	0	0	0	0
Massachusetts.....	18	32	21	11	29	47	0	0	0	12	38	3
Rhode Island.....	5	0	1	0	2	3	0	0	0	0	2	1
Connecticut.....	3	20	20	3	7	8	0	0	0	2	2	2
MIDDLE ATLANTIC												
New York.....	89	138	69	72	73	62	0	0	0	20	10	13
New Jersey.....	21	96	29	21	18	18	0	0	0	5	5	4
Pennsylvania.....	14	61	61	22	41	41	0	0	0	9	11	18
EAST NORTH CENTRAL												
Ohio.....	43	33	33	57	44	50	0	1	0	7	6	13
Indiana.....	27	22	7	9	11	11	0	0	0	1	3	3
Illinois.....	201	94	37	32	37	37	0	0	0	2	2	6
Michigan <sup>3</sup> .....	87	13	18	26	32	31	0	0	0	3	3	6
Wisconsin.....	184	15	15	17	47	35	0	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota.....	208	9	11	11	15	15	0	0	0	0	0	0
Iowa.....	24	31	7	10	5	7	0	0	0	2	2	2
Missouri.....	63	29	11	6	14	11	0	0	0	1	4	9
North Dakota.....	74	0	1	0	10	2	0	1	0	0	0	0
South Dakota.....	22	4	1	1	2	9	0	0	0	0	1	1
Nebraska.....	51	9	7	3	2	3	0	0	0	0	0	0
Kansas.....	48	15	8	2	30	23	0	0	0	1	1	4
SOUTH ATLANTIC												
Delaware.....	1	4	3	1	2	2	0	0	0	0	1	0
Maryland <sup>2</sup> .....	10	3	3	18	9	9	0	0	0	1	2	2
District of Columbia.....	4	8	8	2	0	2	0	0	0	3	1	1
Virginia.....	8	32	5	4	17	8	0	0	0	1	3	5
West Virginia.....	5	1	2	18	23	23	0	0	0	1	8	8
North Carolina.....	5	10	10	11	38	27	0	0	0	1	1	7
South Carolina.....	0	12	4	1	6	4	0	0	0	0	6	4
Georgia.....	8	6	6	7	7	7	0	1	0	3	7	7
Florida.....	10	4	2	2	3	2	0	0	0	3	2	2
EAST SOUTH CENTRAL												
Kentucky.....	6	2	10	2	22	17	0	0	0	2	7	8
Tennessee.....	18	23	5	8	29	19	0	0	0	1	12	12
Alabama.....	24	2	2	5	7	11	0	0	0	1	3	5
Mississippi <sup>2</sup> .....	20	3	3	4	8	7	0	0	0	3	1	5
WEST SOUTH CENTRAL												
Arkansas.....	23	4	3	1	3	3	0	0	0	3	2	7
Louisiana.....	16	7	1	18	1	1	0	0	0	2	3	4
Oklahoma.....	14	16	2	2	4	4	0	0	0	0	2	5
Texas.....	23	33	8	18	43	18	0	0	0	8	17	17
MOUNTAIN												
Montana.....	9	0	2	3	6	6	0	0	0	2	4	1
Idaho.....	2	3	1	1	3	3	0	0	0	2	1	1
Wyoming.....	14	2	0	0	3	1	0	0	0	1	0	0
Colorado.....	77	15	5	5	10	10	0	0	0	1	4	0
New Mexico.....	11	0	1	3	2	3	0	0	0	0	3	2
Arizona.....	7	1	1	3	2	1	0	0	0	3	3	3
Utah <sup>2</sup> .....	11	34	3	11	0	2	0	0	0	0	0	0
Nevada.....	0	0	0	2	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	28	22	12	14	15	14	0	0	0	3	2	2
Oregon.....	15	5	5	3	8	7	0	0	0	2	0	1
California.....	218	33	12	46	81	53	0	0	0	10	7	2
Total.....	1,780	917	917	527	782	683	0	3	3	123	193	193
35 weeks.....	*12,420	6,156	5,898	87,912	136,195	99,317	270	273	616	2,785	3,111	3,685

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 12; New York 4; New Jersey 2; Indiana 1; Illinois 1; Michigan 1; Virginia 1; Georgia 1; Florida 1; Texas 2; California 4.

<sup>3</sup> Correction: North Carolina, poliomyelitis, week ended July 27, 1 case (instead of 2).

Telegraphic morbidity reports from State health officers for the week ended Aug. 31, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Aug. 31, 1946								
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever	
	Aug. 31, 1946	Sept. 1, 1945		Ame- bic	Bacil- lary	Un- speci- fied						
NEW ENGLAND												
Maine.....	1	18	19									
New Hampshire.....		2	1								1	
Vermont.....	23	14	16								1	
Massachusetts.....	108	181	110					1				
Rhode Island.....	12	18	10									
Connecticut.....	23	45	38	1							2	
MIDDLE ATLANTIC												
New York.....	134	293	293	22	4						7	
New Jersey.....	123	138	127	1		1		1			3	
Pennsylvania.....	90	135	135		1							
EAST NORTH CENTRAL												
Ohio.....	87	141	141	1		1		1			4	
Indiana.....	26	9	17					1	1		5	
Illinois.....	146	70	156	5	1			1			9	
Michigan <sup>1</sup> .....	249	142	221		3							
Wisconsin.....	295	51	208	1							8	
WEST NORTH CENTRAL												
Minnesota.....	1	7	41	3							5	
Iowa.....	41	10	11	3							1	
Missouri.....	13	17	13						1	1		
North Dakota.....	1	4	13			3		5				
South Dakota.....		6	4									
Nebraska.....	1	2	3									
Kansas.....	20	50	38								3	
SOUTH ATLANTIC												
Delaware.....	7	1	1									
Maryland <sup>1</sup> .....	43	45	55				1	1			3	
District of Columbia.....	20	8	10									
Virginia.....	37	23	23			54		6	2		1	
West Virginia.....	34	23	17					3				
North Carolina.....	43	147	100		1			2		2	2	
South Carolina.....	14	62	61		4			1				
Georgia.....	2	21	19	2	2			2		19	2	
Florida.....	33	3	19						1	11		
EAST SOUTH CENTRAL												
Kentucky.....	13	36	36	1								
Tennessee.....	23	28	27		3			3	1	3	2	
Alabama.....	16	3	16	3			1			15	4	
Mississippi <sup>1</sup> .....									1		7	
WEST SOUTH CENTRAL												
Arkansas.....	1	10	10								2	
Louisiana.....		1	1							1	1	
Oklahoma.....	1	20	7		1		1	3				
Texas.....	138	125	139	18	175	25			1	25	10	
MOUNTAIN												
Montana.....	3	2	17									
Idaho.....	6	1	1								2	
Wyoming.....		5	5						1			
Colorado.....	11	33	33	1								
New Mexico.....	19	9	8		5	6					1	
Arizona.....	4	4	7			15	1				6	
Utah <sup>1</sup> .....	8	35	35				1				1	
Nevada.....												
PACIFIC												
Washington.....	26	36	36								3	
Oregon.....	8	12	19					1				
California.....	60	130	130	2	2		4				2	
Total.....	1,970	2,124	2,536	64	202	105	18	23	9	78	97	
Same week, 1945.....	2,124			45	563	340	35	14	13	151	72	
Average, 1943-45.....	2,117			38	542	270	34	14	10	128		
86 weeks: 1946.....	68,302			1,995	11,756	4,742	425	476	647	2,296	3,445	
1945.....	88,889			1,274	17,223	6,983	337	386	539	3,050	3,253	
Average, 1943-45.....	97,649		128,043	1,296	14,493	5,951	418	489	517	2,469		

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 24, 1946

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyellitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	---	0	3	0	0	1	1	0	0	---
New Hampshire:												
Concord.....	0	0	---	0	---	0	0	1	0	0	0	---
Vermont:												
Barre.....	0	0	---	0	---	0	0	0	0	0	0	---
Massachusetts:												
Boston.....	1	0	---	0	17	0	9	8	11	0	1	21
Fall River.....	0	0	---	0	---	0	0	0	2	0	0	---
Springfield.....	0	0	---	0	2	0	0	2	0	0	0	9
Worcester.....	0	0	---	0	4	0	5	6	1	0	0	33
Rhode Island:												
Providence.....	1	0	---	0	10	0	0	0	3	0	0	35
Connecticut:												
Hartford.....	0	0	---	0	6	0	0	0	0	0	0	3
New Haven.....	0	0	---	0	1	0	0	1	1	0	0	---
MIDDLE ATLANTIC												
New York:												
Buffalo.....	1	0	---	0	1	0	2	1	3	0	1	5
New York.....	8	3	3	1	19	2	27	50	11	0	18	45
Rochester.....	0	0	---	0	---	0	0	1	0	0	0	---
Syracuse.....	0	0	---	0	---	0	1	6	1	0	0	1
New Jersey:												
Camden.....	0	0	---	0	1	0	1	2	0	0	0	2
Newark.....	0	0	---	0	4	0	2	1	4	0	1	29
Trenton.....	0	0	---	0	---	0	0	1	0	0	0	1
Pennsylvania:												
Philadelphia.....	0	0	1	0	3	1	6	3	5	0	1	33
Pittsburgh.....	0	0	---	0	3	0	5	3	1	0	0	5
Reading.....	0	0	---	0	1	0	1	0	0	0	1	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0	---	0	1	0	0	7	5	0	0	2
Cleveland.....	0	0	1	0	35	3	3	24	6	0	0	8
Columbus.....	1	0	---	0	1	0	1	0	2	0	0	7
Indiana:												
Fort Wayne.....	0	0	---	0	---	0	0	0	0	0	0	---
Indianapolis.....	0	1	---	0	1	0	1	3	2	0	1	4
South Bend.....	0	0	---	0	---	0	0	0	0	0	0	---
Terre Haute.....	0	0	---	0	---	0	0	0	0	0	0	---
Illinois:												
Chicago.....	0	0	---	0	3	1	16	64	11	0	0	89
Springfield.....	0	0	---	0	---	0	1	11	1	0	0	3
Michigan:												
Detroit.....	6	0	---	0	8	0	8	29	8	0	2	69
Flint.....	0	0	---	0	---	0	1	1	0	0	0	9
Grand Rapids.....	0	0	---	0	1	0	0	4	1	0	1	3
Wisconsin:												
Kenosha.....	0	0	---	0	---	0	0	22	1	0	0	4
Milwaukee.....	1	0	---	0	2	0	1	14	3	0	0	92
Racine.....	0	0	---	0	---	0	0	2	0	0	0	6
Superior.....	1	0	---	0	3	0	0	4	0	0	0	5
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	---	0	---	0	1	14	1	0	0	---
Minneapolis.....	1	0	---	0	1	0	2	68	2	0	0	2
St. Paul.....	2	0	---	0	1	0	1	26	2	0	9	5
Missouri:												
Kansas City.....	0	0	---	0	---	0	4	12	2	0	0	17
St. Joseph.....	0	0	---	0	---	0	0	1	11	0	0	1
St. Louis.....	1	1	---	0	---	0	6	31	3	0	0	---

## City reports for week ended Aug. 24, 1946—Continued

	Diphtheria cases	Etiophthalmia, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pelionmyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0		0		0	0	14	0	0	0	1
Nebraska:												
Omaha.....	0	0		0		0	2	14	3	0	0	
Kansas:												
Topeka.....	0	0		0		0	0	2	1	0	0	1
Wichita.....	0	0		0		0	3	0	0	0	0	
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0		0		0	0	0	1	0	0	
Maryland:												
Baltimore.....	6	0		0	8	1	1	0	1	0	0	20
Cumberland.....	0	0		0		0	0	0	0	0	0	
Frederick.....	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington.....	0	0		0	10	2	3	2	3	0	2	5
Virginia:												
Richmond.....	2	0		0		0	1	2	0	0	0	9
Roanoke.....	1	0		0		0	0	1	0	0	0	
West Virginia:												
Charleston.....	0	0		0		0	0	0	1	0	0	
Wheeling.....	1	0		0		0	1	0	0	0	0	7
North Carolina:												
Raleigh.....	1	0		0		0	0	0	0	0	0	4
Wilmington.....	0	0		0		0	1	0	0	0	0	
Winston-Salem.....	0	0		0		0	0	0	0	0	0	6
South Carolina:												
Charleston.....	0	0	1	0	1	0	0	0	0	0	0	
Georgia:												
Atlanta.....	0	0		0		0	0	1	1	0	0	1
Brunswick.....	0	0		0		0	1	0	0	0	0	
Savannah.....	0	0		0	1	0	0	1	1	0	0	1
Florida:												
Tampa.....	6	0		0		0	0	1	0	0	0	7
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0		0	1	0	10	2	0	0	1	7
Nashville.....	0	0		0		0	4	0	0	0	0	
Alabama:												
Birmingham.....	0	0		0		0	4	12	1	0	0	
Mobile.....	1	0	1	0		1	2	1	0	0	0	
WEST SOUTH CENTRAL												
Louisiana:												
New Orleans.....	0	0		0	4	0	8	26	0	0	4	
Shreveport.....	0	0		0		0	0	0	1	0	1	
Texas:												
Dallas.....	1	0		0		0	1	6	1	0	0	1
Galveston.....	1	0		0		0	1	1	0	0	0	
Houston.....	0	0		0	2	0	3	0	3	0	0	
San Antonio.....	0	0		0		0	1	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings.....	0	0		0		0	1	0	0	0	0	
Great Falls.....	0	0		0	3	0	0	0	0	0	1	8
Helena.....	0	0		0		0	0	0	0	0	0	
Missoula.....	0	0		0		0	0	0	0	0	0	
Idaho:												
Boise.....	0	0		0		0	1	0	0	0	0	
Colorado:												
Denver.....	4	0	3	0	1	0	3	17	16	0	0	12
Pueblo.....	0	0		0		0	1	2	0	0	0	
Utah:												
Salt Lake City.....	0	0		0		0	0	4	2	0	0	

## City reports for week ended Aug. 24, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	1	0	0	0	0	0	2	7	3	0	0	9
Spokane.....	0	0	0	0	0	0	0	5	2	0	0	0
Tacoma.....	0	1	0	0	0	0	0	0	1	0	0	1
California:												
Los Angeles.....	1	0	2	0	18	0	1	71	6	0	0	4
Sacramento.....	0	0	0	0	0	0	1	0	0	0	1	0
San Francisco.....	2	0	0	0	2	1	3	2	6	0	0	2
Total.....	53	6	12	1	183	12	166	619	160	0	34	656
Corresponding week, 1945	51		13	5	194		212		229	0	34	957
Average, 1941-45.....	43		23	16	204		219		194	0	32	928

<sup>1</sup> 3-year average, 1943-45.

<sup>2</sup> 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: Boston 1; New York 1; Philadelphia 1; Chicago 1; Atlanta 1; Los Angeles 4.

*Dysentery, bacillary.*—Cases: New York 1; Chicago 2; Detroit 3; Charleston, S. C., 3; Memphis 1; Los Angeles 4.

*Dysentery, unspecified.*—Cases: San Antonio 2.

*Leprosy.*—Cases: New Orleans 1.

*Rocky Mountain spotted fever.*—Cases: Philadelphia 1; Richmond 1; Atlanta 1.

*Typhus fever, endemic.*—Cases: Omaha 1; Charleston, S. C., 3; Atlanta 1; Tampa 2; Birmingham 2; Mobile 2; New Orleans 2; Dallas 2; Galveston 3; Houston 4; Los Angeles 1.

*Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 34,109,500)*

	Diphtheria case rates	Enccephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polymyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.7	0.0	0.0	0.0	122	0.0	39.6	33.8	54	0.0	2.8	286
Middle Atlantic	4.2	1.4	1.9	0.5	15	1.4	20.8	31.5	12	0.0	9.9	57
East North Central	6.1	0.6	0.6	0.0	33	2.4	19.5	112.5	24	0.0	2.4	184
West North Central	8.0	2.0	0.0	0.0	4	0.0	37.8	362.1	0	0.0	0.0	56
South Atlantic	28.1	0.0	1.7	0.0	33	5.0	13.2	13.2	13	0.0	3.3	99
East South Central	5.9	0.0	5.9	0.0	6	5.9	118.0	88.5	6	0.0	5.9	41
West South Central	6.0	0.0	0.0	0.0	18	0.0	42.3	99.8	18	0.0	15.1	6
Mountain	31.8	0.0	23.8	0.0	32	0.0	55.6	190.6	143	0.0	7.9	119
Pacific	6.3	1.6	3.2	0.0	32	1.6	11.1	134.4	28	0.0	1.6	25
Total	8.1	0.9	1.8	0.2	28	1.8	25.4	94.9	25	0.0	5.2	101

**PLAGUE INFECTION IN SCOTT COUNTY, KANS.**

Under date of Aug. 27, 1946, plague infection was reported proved, on Aug. 27, in tissue from 1 prairie dog, *Cynomys* sp., taken Aug. 16, in Scott County, Kans., from a ranch 12 miles west of Scott City and 6 miles north of State Highway No. 96. (For previous report of plague infection in this area, see PUBLIC HEALTH REPORTS, Aug. 30, 1946, p. 1287.)

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended August 10, 1946.*—During the week ended August 10, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunsw- wick	Que- bec	Ont- ario	Mani- toba	Sas- katch- ewan	Al- berta	British Colum- bia	Total
Chickenpox.....		4		65	81	9	6	17	15	197
Diphtheria.....				41	5	2	1			49
Dysentery, amebic.....					1					1
German measles.....				3	6		1	2	5	17
Influenza.....						4				4
Measles.....		2		52	149	41	20	62	25	351
Meningitis, meningococ- cus.....			1	1	1	2			1	6
Mumps.....				8	91	17	60	17	42	235
Poliomyelitis.....	4		5	141	25	5		4	1	185
Scarlet fever.....		3		18	42	2	6	6	3	80
Tuberculosis (all forms).....		8	11	78	53	14	9	2	36	211
Typhoid and paraty- phoid fever.....				25	3				9	37
Undulant fever.....					2			11		13
Veneral diseases:										
Gonorrhea.....		11	14	121	137	40	32	34	89	478
Syphilis.....		19	8	106	62	10	15	10	40	270
Whooping cough.....		13		145	72	5		7		242

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*China.*—Cholera has been reported in China as follows: Anhwei Province—July 21-31, 1946, 504 cases, 66 deaths; Chekiang Province—July 11-20, 206 cases, 24 deaths; Fukien Province—July 21-31, 1946, 265 cases, 44 deaths, including 264 cases with 43 deaths reported in Foochow; Honan Province—July 21-31, 1946, 425 cases, 73 deaths; Hunan Province—July 21-31, 1946, 297 cases, 69 deaths; Kiangsi Province—August 1-10, 1946, 305 cases, 47 deaths reported in Nanchang; Kiangsu Province—August 1-10, 1946, 124 cases, 7 deaths, reported in Nanking; Kwangtung Province—August 1-10, 1946, 94 cases, 11 deaths reported in Swatow.



**Plague**

*China—Fukien Province.*—Plague has been reported in Fukien Province, China, as follows: July 1–10, 1946, 92 cases, 52 deaths, including 32 cases with 14 deaths reported in Futsing; July 11–20, 1946, 48 cases, 15 deaths, including 28 cases with 12 deaths reported in Futsing; July 21–31, 1946, 45 cases, 16 deaths, including 38 cases with 13 deaths reported in Foochow.

**Typhus Fever**

*Mexico.*—During the month of July 1946, 201 cases of typhus fever were reported in Mexico. States reporting the highest incidence are: Mexico, 38 cases; Mexico, D. F., 26 cases; Oaxaca, 24 cases; Nuevo Leon, 20 cases; Coahuila, 14 cases; Guanajuato, 12 cases; Puebla, 12 cases; Nayarit, 8 cases; Zacatecas, 7 cases; Michoacan, 7 cases; Hidalgo, 5 cases; San Luis Potosi, 5 cases.

**Yellow Fever**

*Nigeria—Oyo Province.*—Under date of August 28, 1946, 2 cases of suspected yellow fever were reported in Ilesha and 5 cases of suspected yellow fever were reported in Sapele, Oyo Province, Nigeria.

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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# Public Health Reports

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Prophylaxis of Influenza Infections in Eggs

Antigen from Yolk Sac Infected with Tsutsugamushi



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## NATIONAL INSTITUTE OF HEALTH RESEARCH FELLOWSHIPS

The United States [Public] Health Service announces the continuation of the National Institute of Health Research Fellowships which were created in 1945. An increased number of these fellowships will be available during [1946] and 1947.

The National Institute of Health Research Fellowships are awarded to individuals who have had postgraduate work in institutions of recognized standing in the various fields of science allied to public health, as biology, chemistry, physics, entomology, medicine, dentistry, veterinary medicine, etc.

Applications for these fellowships may be made at any time during the year, are acted upon promptly, and are effective for one year from the time of award with a possibility of renewal for a second year.

Junior research fellowships are available to individuals holding master's degrees or to those who have completed an equivalent number of hours of postgraduate study. The stipend is \$2,400 per annum.

Senior research fellowships are available to individuals holding doctorate degrees. The stipend is \$3,000 per annum.

These fellowships will offer an opportunity for study and research in association with highly trained specialists in the candidate's chosen field at the Institute or some other institution of higher learning.

Letters of inquiry should be addressed to The Director, National Institute of Health, Bethesda 14, Md.

## TYPICAL STRUCTURES ON REPLICAS OF APPARENTLY INTACT TOOTH SURFACES <sup>1</sup>

By DAVID B. SCOTT, *Senior Assistant Dental Surgeon (R)*, and RALPH W. G. WYCKOFF, *Scientist Director, United States Public Health Service*

A method of studying tooth surfaces *in situ* and *in vitro* by examination of metal-shadowed collodion replicas has been described in a previous publication (1). Such replicas are suitable for either optical or electron microscopy, but it has seemed unwise to make an extensive

---

<sup>1</sup> From the Division of Physiology and Industrial Hygiene Research Laboratory, National Institute of Health.

investigation of ultra-structures seen under the electron microscope until a thorough understanding has been gained of the wealth of detail visible under low magnifications. The present paper is devoted to a description and illustration of typical structures commonly seen under the optical microscope. It is based on an inspection of approximately 2,000 replicas, about 500 of which have been obtained from teeth *in situ*.

The replica method is most generally applicable to the study of smooth surfaces of the teeth, but sometimes replicas can be made of occlusal inclined planes. Replicas for the present work have been taken from the various smooth surfaces of extracted teeth, and from the accessible surfaces of teeth in the mouth. The latter have consisted of buccal, labial, and lingual surfaces of all teeth except third molars, and of proximal surfaces when either the adjacent tooth was missing or approximal contact was such that at least a partial replica could be taken buccal or labial to the contact point.

Prior to taking replicas, all extracted teeth have been washed with soap and water and a hand brush, and inspected for debris or plaques, Bender's disclosing solution (2) generally being used for the detection of the latter. Replicas have been made of surfaces before and after pumicing, before and after removing visible surface deposits, and under a variety of other conditions. In the intra oral work some teeth have been pumiced, others have been checkstained with the disclosing solution prior to taking replicas, but usually the preparatory treatment has been limited to ordinary brushing with a toothbrush by the individual, followed by inspection and cleaning by the operator with cotton pellets saturated with ether and alcohol.

A number of structures appearing on the replicas can be identified and described in terms of histologic components of the enamel as seen in ground sections. Other details appear only on a surface, and have no counterparts in ground sections. Most tooth surfaces are subject to great variation from point to point, and show several of these structures within a single microscope field; very few are homogeneous. The most common structures on replicas from surfaces which have seemed intact on visual inspection are the following:

1. *Enamel rod-ends*.—These are visible to some extent on nearly every replica. Sometimes they appear only in small areas (fig. 5) and at other times the entire surface shows an evenly distributed rod pattern (figs. 1, 2, 7). The rod outlines resemble those described from ground sections, i. e. three sides, with two of these concave and the third convex (Ref. 1, fig. 4). The rod-ends, from  $5\mu$  to  $10\mu$  in diameter, are apparently concave since they appear as elevations on the replicas (figs. 1, 2, 5, 7). Occasionally they are very smooth, but more often they are rough and show a fine dotted pattern at magnifications

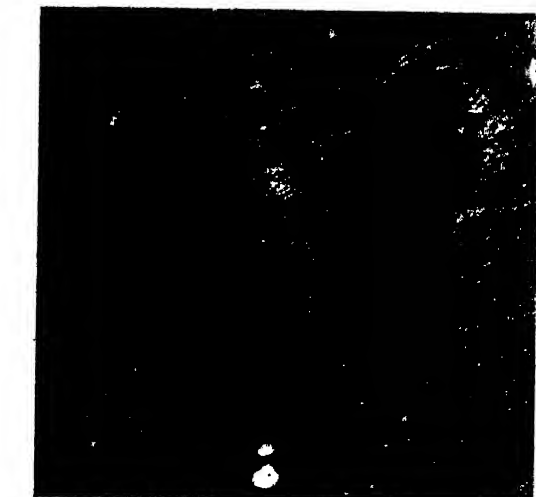


FIGURE 1.—Enamel rod-ends showing chainlike arrangement. (Mesial surface of extracted lower left third molar. 100 X.)



FIGURE 2.—Perikymata following regular course, but showing individual irregularities. (Mesial surface of extracted lower left first bicuspid. 150 X.)



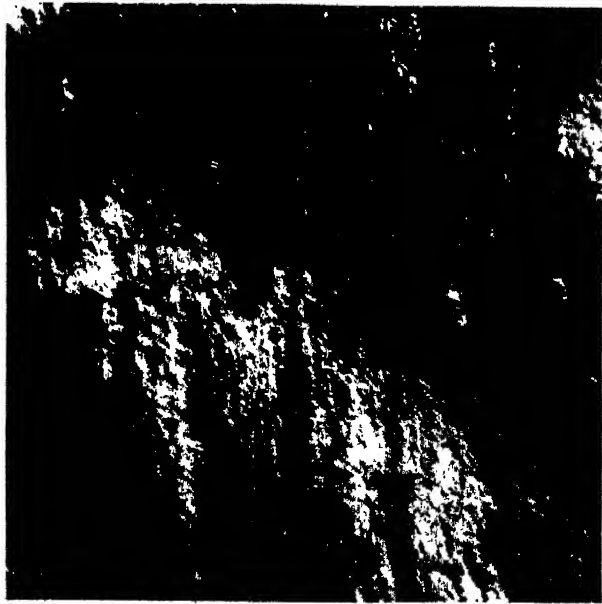


FIGURE 3.—Wide flat-bottomed perikymata following regular course. (Buccal surface of extracted upper left first bicuspid. 150 X.)



FIGURE 4.—Narrow, sharp perikymata following regular course. (Labial surface of upper left central, *in situ*. 150 X.)

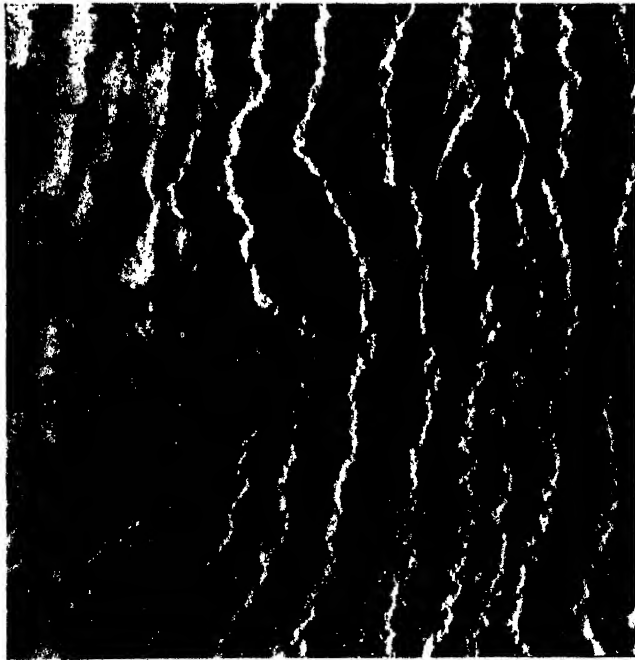


FIGURE 5.—Perikymata showing interruptions and aberrations of course.  
(Buccal surface of extracted upper left second molar. 150 X.)



FIGURE 6.—Perikymata showing marked aberrations of course.  
(Mesial surface of extracted lower left first bicuspoid. 150 X.)

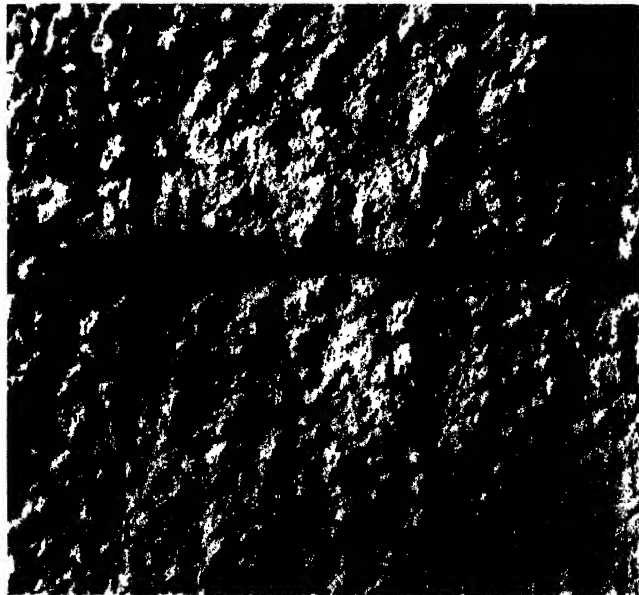


FIGURE 7.—Crack in enamel surface. (Labial surface of extracted upper left central. 150 X).

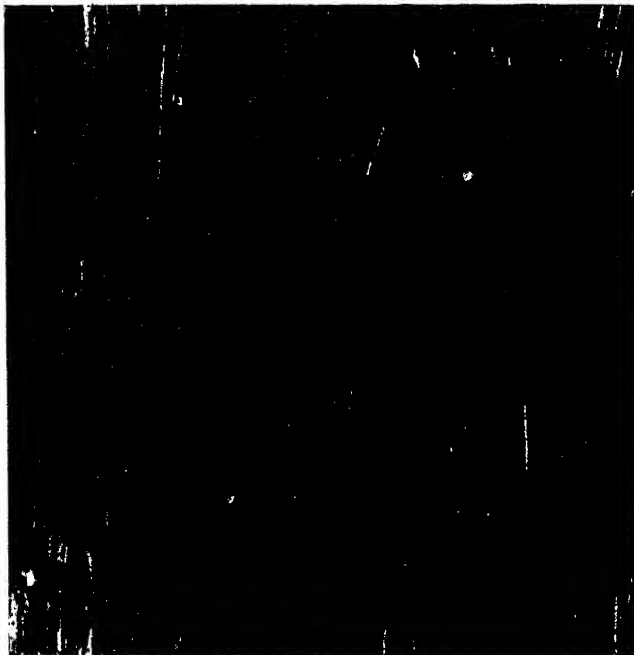


FIGURE 8.—Scratches in enamel surface. (Labial surface of extracted lower right lateral. 150 X).



FIGURE 9.—Microscopic roughness in apparently flawless surface. (Labial surface of upper right central, *in situ*. 150 X.)

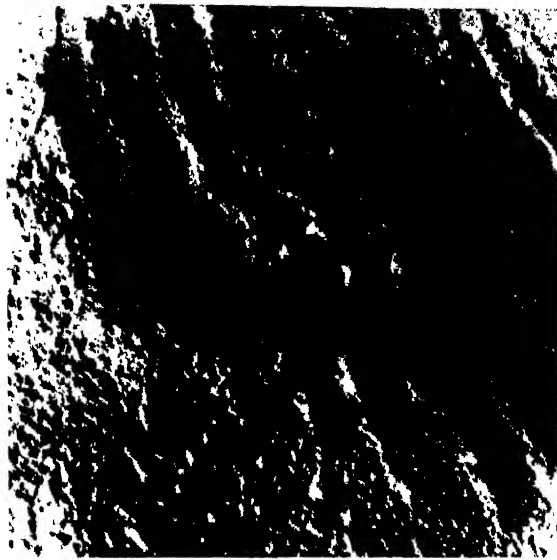


FIGURE 10.—Microscopic roughness in small opaque area. (Labial surface of extracted upper left lateral. 100 X.)

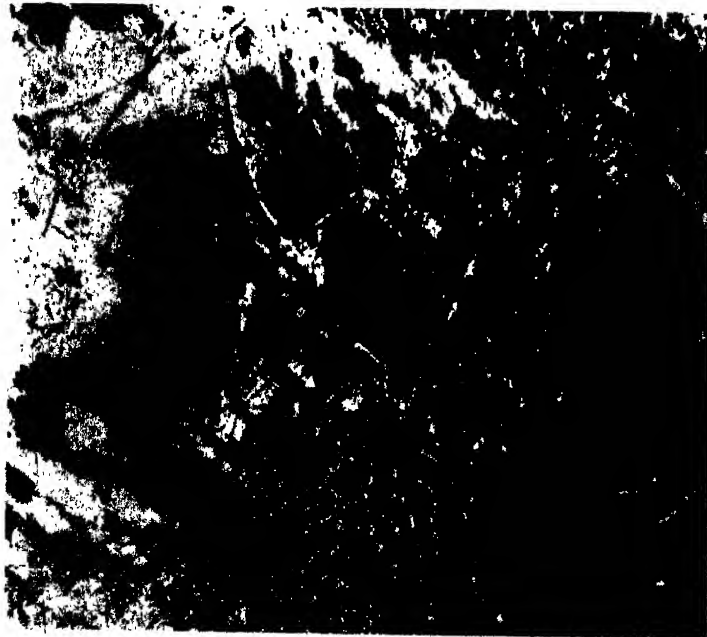


FIGURE 11.—Microscopic roughness in area of mild decalcification. (Mesial surface of extracted lower left second molar. 150 X.)



FIGURE 12.—Severe abrasion at contact point. (Mesial surface of extracted lower right second molar. 150 X.)

approaching 1,000  $\times$ . The concavity of the ends varies greatly and determines the visibility of the rods. When it is deep they are prominent at low magnifications (figs. 1, 2, 5, 7); when it is shallow the replica may seem almost, though usually not completely, rod-free (fig. 8).

2. *Interprismatic material*.—Wherever rod-ends are visible they are separated by from  $1\mu$  to  $3\mu$  of interprismatic material. This thickness varies considerably even in a single area and on different sides of a single rod-end. The sweeping, chainlike appearance of many rows of rod-ends is due to this variation in width (figs. 1, 7).

3. *Perikymata*.—One or more surfaces of nearly all teeth show these transverse waves which vary greatly in depth, in contour, and in distance apart. Usually they are from  $15\mu$  to  $100\mu$  apart (figs. 2, 3, 4, 5, 6, 10). They are often close together in the gingival portion of the surface, and farther apart near the incisal or occlusal edge. Most perikymata appear to be from  $3\mu$  to  $10\mu$  deep, but this depth may vary along an individual wave (figs. 2, 4, 5). Sometimes the groove is flat on the bottom (fig. 3), sometimes it is rounded (fig. 10), but in most cases it is a fairly sharp furrow (figs. 2, 4, 5, 6). Often the perikymata sweep across the surface in uniform, diphasic curves (figs. 3, 4). Many, however, show marked aberrations from this regular course. Occasionally they dip sharply for short distances and return to the same horizontal baseline (figs. 5, 6). Sometimes they stop completely in a rough area (fig. 11), an opaque (fig. 10), an abraded (fig. 12), or even an unaffected area (figs. 2, 5), and then resume their previous course a short distance farther along.

4. *Cracks*.—Cracks are evident on the surface of most extracted teeth and on many teeth *in situ*. They vary in length, width, depth, and number on a surface. Typical examples are shown in figures 6 and 7. Some of the cracklike details may be identical with what are commonly designated in ground sections as lamellae (fig. 7); on the replicas no satisfactory differentiation between the two has yet been possible.

5. *Scratches*.—Practically all tooth surfaces show many scratches. They vary from several micra to several millimeters in length and generally are shallow and narrow. Various types are seen in figures 3, 4, 5, 6, 7, 8, 9, and 11.

6. *Microscopic roughness*.—This is a minor type of surface irregularity which appears in replicas taken over white spots, decalcified areas, and over many regions which appear flawless on visual inspection of the tooth. Almost every replica has shown some area of microscopic roughness. It is characterized by a granular background which appears to be produced by many exceedingly small pits close together, and by numerous larger depressions, some pitlike, others

elongated, and none more than a few micra deep. Perikymata are generally absent or far less pronounced than in adjacent regions. The rod detail occasionally noted in the background is often pronounced and at other times very faint. Microscopic roughness associated with an apparently flawless surface is shown in figures 3 and 9. In the former a rod pattern is faintly visible. The replica of figure 10 was taken over a small white spot which could be seen only by transilluminating the tooth. The opaque region and its associated micro-roughness appear in the upper left corner of the picture. Figure 11 shows the more marked roughness of an area of very mild decalcification. Small unevenly distributed areas of micro-roughness are seen in figures 5 and 6.

7. *Abrasion*.—Most proximal surfaces which have been in contact with those of adjacent teeth show some degree of abrasion. Often the worn contact point is immediately evident on visual inspection, but frequently the wear is so slight that it can be seen only on microscopic examination of the replica. Abrasion is often seen on buccal and labial surfaces, especially on the occlusal and incisal thirds of lower teeth. Replicas from abraded areas tend to be flatter than those from surrounding regions. The perikymata are worn down and rod detail is usually absent. The entire region may be indented by short, shallow, closely spaced grooves and pits whose depth and distribution usually permit a differentiation between abrasion and other types of roughness. Figure 12 is an example of a replica taken over a severely abraded contact point.

8. *Smooth areas*.—Many replicas show regions which are devoid of microscopically visible detail, or of detail other than light scratches (fig. 11). Smooth areas extensive enough to cover an entire replica are, however, rarely encountered.

Pathologically affected teeth show more or less characteristic details in addition to the structures listed above. Replicas of the various stages in carious disintegration, small pit cavities, microscopic and macroscopic hypoplastic pits, evidences of fluorosis, and other surface irregularities will be described in subsequent publications.

#### Summary

The types of detail most commonly seen on examination of metal-shadowed replicas of apparently intact tooth surfaces are described and illustrated by a series of photomicrographs. These reveal marked differences between surfaces and on individual surfaces, even though the surfaces look intact and flawless on visual inspection.

#### References

- (1) Scott, D. B., and Wyckoff, R. W. G.: Shadowed Replicas of Tooth Surfaces. Pub. Health Rep., 61: 697-700 (May 17, 1946).
- (2) Bender, D. V.: U. S. Patent No. 2,151,495 (See Chem. Abstr. 33: 5132 (1939))

## CHEMOPROPHYLAXIS OF EXPERIMENTAL INFLUENZA INFECTIONS IN EGGS<sup>1</sup>

By R. H. GREEN, A. F. RASMUSSEN, Jr., and J. E. SMADEL

Nitroakridin 3582 or, 2,3-dimethoxy-6-nitro-9-(diethyl-amino-oxy-propyl) aminoacridine-dihydrochloride, has been shown to have a beneficial effect in experimental infections with several rickettsial agents (1, 2). Furthermore, other acridine compounds are now known to inhibit the growth of bacteriophage (3). Preliminary experiments in which embryonated eggs infected with influenza B virus were treated with nitroakridin 3582 have given sufficiently encouraging results to warrant the present report.

### MATERIALS AND METHODS

Stock virus for the experiments consisted of chorioallantoic fluids from embryonated eggs infected with Lee strain influenza virus which were pooled and stored in the frozen state until standardized by titration in eggs. Samples of the thawed material were then diluted so that inocula for each experiment contained the desired number of minimal infecting doses (MID), as calculated by the 50 percent end-point method. A stock solution of nitroakridin with a concentration of 20 mg./cc. was prepared in 0.9 percent NaCl solution buffered at pH 7.6, sterilized in the autoclave at 10 pounds pressure for 10 minutes, and diluted with an equal volume of buffered saline before injection into eggs. Usually equal volumes of the desired dilution of virus made with buffered salt solution were mixed with nitroakridin solution and immediately injected into the chorioallantoic sacs of 11-day embryonated eggs. In some experiments, the dilutions of virus were made with normal chorioallantoic fluid and then mixed with the drug and injected; while in others the drug and virus, both in buffered saline, were injected separately into the chorioallantoic sac. Except in experiments 12 and 13b, each egg received an inoculum totaling 0.1 cc. which contained 0.5 mg. of the drug and from 1 to 10,000 MID of virus. In experiments 12 and 13b the nitroakridin was injected 1 hour before the virus; and in experiment 12 three doses were used, i. e., 0.5, 0.25, and 0.1 mg. The final pH of mixtures of drug and virus diluted in buffered saline was 5.6, and that of mixtures of drug and virus diluted in chorioallantoic fluid was 6.5; both of these values are above the pH range at which influenza virus is inactivated (4). Control groups of eggs received corresponding amounts of the drug or of the virus. Inoculated eggs were incubated at 35° C. for 2 to 5 days and those embryos dying before the termination of the experiment were discarded. At the end of the incubation period,

<sup>1</sup> From the Division of Virus and Rickettsial Diseases, Army Medical School, Army Medical Center.



the eggs were chilled at 4° C. for several hours. The chorioallantoic fluids were then harvested and tested individually for their content of virus by the red cell agglutination technique, using 0.5 cc. amounts of serial twofold dilutions of allantoic fluid with 0.25 cc. amounts of a 1-percent suspension of washed human "O" type cells. No attempt was made to determine amounts of virus below the level demonstrable by red cell agglutination. All fluids failing to agglutinate red cells were arbitrarily regarded as negative.

## RESULTS

The results of eight experiments are summarized in table 1. It is

TABLE 1.—*Effect of nitroakridin 3582 on the propagation of B (Lee) influenza virus in embryonated eggs*

Ex- per- iment No.	Number of eggs inocu- lated	Approxi- mate MID's virus	Nitro- akridin 3582 in mgs.	Incuba- tion (days at 35° C.)	Number of posi- tive <sup>1</sup> eggs over total tested	Number of eggs positive at indicated titer										
						2	4	8	16	32	64	128	256	512	1,024	2,048
4	9	10,000	0.5	3	3/4	---	---	---	---	---	1	1	---	1	---	---
	9	10,000	0	3	4/4	---	---	---	---	---	---	---	1	3	---	---
	9	100	.5	3	2/3	---	---	---	---	---	---	1	---	1	---	---
	9	100	0	3	4/4	---	---	---	---	---	---	---	---	---	4	---
	9	1	.5	3	0/4	---	---	---	---	---	---	---	---	---	---	---
	9	1	0	3	3/4	---	---	---	---	1	---	---	---	---	2	---
11	21	100	.5	2	17/21	---	---	---	---	1	2	2	3	7	2	---
	10	100	0	2	9/10	---	---	---	---	---	---	---	1	---	8	---
12	20	100	.5	3	18/18	---	---	---	---	1	---	2	5	6	5	---
	20	100	.25	3	18/19	---	---	---	---	---	---	1	2	6	5	4
	20	100	.1	3	17/19	---	---	---	---	1	1	2	3	3	6	4
	10	100	0	3	10/10	---	---	---	---	---	---	---	1	2	3	4
5	18	10	.5	3-5	0/12	---	---	---	---	---	---	---	---	---	---	---
	36	10	0	3-5	18/18	---	---	---	---	---	---	---	---	---	13	5
10	21	10	.5	2	0/21	---	---	---	---	---	---	---	---	---	---	---
	10	10	0	2	8/10	---	---	---	---	3	1	1	1	1	2	---
13a	15	10	.5	3	0/14	---	---	---	---	---	---	---	---	---	---	---
13b	15	10	.5	3	0/11	---	---	---	---	---	---	---	---	---	---	---
	15	10	0	3	14/15	---	---	---	---	---	---	---	---	---	3	11
8-9	50	1	.5	4	3/45	---	---	---	2	---	---	---	---	1	---	---
	20	1	0	4	11/20	---	---	---	---	---	---	---	---	---	11	---

<sup>1</sup> Positive: having allantoic fluid with enough virus to be demonstrated by red cell agglutination.

Nitroakridin and indicated amounts of virus diluted in 0.9-percent NaCl buffered at pH 7.6 were mixed and injected together in all experiments except Nos. 11, 12, and 13b. In experiment 11 dilutions were made in normal allantoic fluid and in experiments 12 and 13b the nitroakridin was injected 1 hour before the virus.

evident that no growth of virus occurred in most embryos injected with 1 to 10 MID of virus together with 0.5 mg. of nitroakridin 3582. The allantoic fluids of only 3 of the 107 eggs so treated agglutinated red cells. Furthermore, the virus titers of the three positive fluids from these treated eggs were lower than those of infected control eggs in the same experiments. The addition of nitroakridin in concentrations of 0.4 mg./cc. to known positive allantoic fluids had no effect on the red cell agglutination titers. Moreover, the drug had no appreciable virucidal effect when the virus was exposed to it for short

periods of time at pH 6.5. In one experiment, infected fluid<sup>1</sup> diluted in normal chorioallantoic fluid to contain 2,000 MID per cubic centimeter was mixed with an equal volume of nitroakridin containing 10 mg./cc. After standing at room temperature for 15 minutes, about 5 minutes longer than the time ordinarily required to inoculate a group of eggs in a chemotherapy experiment, serial tenfold dilutions of the virus-drug mixture and of the control virus-allantoic fluid mixture were prepared and inoculated into embryonated eggs. There was no evidence of inactivation of the virus by the drug in this experiment.

In experiments in which 100 or more MID of virus were used, the drug had a less striking effect. Fluids from most of the treated eggs in such groups contained demonstrable virus, table 1. However, here again the agglutinating titers of positive fluids were generally lower than those of control infected eggs in the same experiment.

#### SUMMARY

Nitroakridin 3582 has an inhibitory effect on the growth of influenza B virus in embryonated eggs. This effect is most apparent when small virus inocula are employed.

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### SEPARATION OF THE COMPLEMENT-FIXING AGENT FROM SUSPENSIONS OF YOLK SAC OF CHICK EMBRYO INFECTED WITH THE KARP STRAIN OF TSUTSUGAMUSHI DISEASE (SCRUB TYPHUS)<sup>1</sup>

By IDA A. BENGTSON, *Senior Bacteriologist, United States Public Health Service*

It has been shown that a complement-fixing agent is present in yolk sacs infected with the Karp strain of tsutsugamushi disease (scrub typhus) (1). This is of practical importance as furnishing a means for diagnosis in cases of suspected scrub typhus fever. As was pointed out, the antigenic portion of the ether-treated 10-percent suspension of yolk sac used was predominantly in the emulsion of tissue layer,

<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health. [Assigned date of publication, Mar. 23, 1945, but withheld for security reasons.]

rather than in the aqueous layer, as is true of epidemic and endemic typhus. Several methods were attempted to obtain a separation of the antigenic agent from the considerable amount of tissue present in the emulsion layer. However, the rather turbid suspension was found fairly satisfactory for use in the complement-fixation test as it was not anticomplementary and the presence of the extraneous tissue did not interfere with obtaining readings of the test.

By a slight modification of the method of applying the ether treatment it has been possible to obtain as much or more of the antigen in the aqueous portion as in the tissue layer. If it is desired to recover more of the antigenic factor than is present in the aqueous layer, the tissue layer may be subjected to processes of differential centrifugation and the final sediment from this added to the aqueous layer. In both cases further purification may be effected by isoelectric precipitation of the remaining tissue. By this means a product which is almost water clear may be obtained.

The usual method of applying ether treatment to the preparation of epidemic and endemic typhus antigens has been to add an equal volume of diethyl ether to a 10-percent suspension of infected yolk sac treated with 0.1 percent formalin or 0.01 percent merthiolate, then to shake in a separatory funnel and allow to stand until there is a separation into three layers, the ether layer, the tissue layer, and the aqueous layer. The time necessary for this varies. It may require 15 to 30 minutes or overnight standing.

The modification employed in the preparation of the scrub typhus antigens involves the use of 20-percent suspensions of the infected yolk sacs. These are preferably heavily infected yolk sacs from embryos which have succumbed as a result of the infection. The suspension of the yolk sac is held in the refrigerator not more than 24 hours. The reaction of the suspension is adjusted to pH 7.0. It is mixed with an equal volume of diethyl ether shaken vigorously and immediately spun in the horizontal centrifuge at 2,000 r. p. m. for 15 minutes. After this treatment there will be present the upper layer of ether which is orange colored, a rather shallow layer of tissue, below this, and an aqueous layer comprising about nine-tenths of the total volume of the original material and a small amount of precipitate at the bottom of the container.

The ether is removed by pipetting. The middle rather clear layer (fraction A) of the remainder is removed by pipetting or siphoning, leaving the upper tissue layer and the precipitate in the bottom of the container (fraction B). This is suspended in a volume of saline equivalent to that of fraction A for purposes of complement-fixation

testing to determine the relative amounts of antigen present in the two fractions. Titrations of several lots of the original yolk-sac suspensions and of fractions A and B against a 1:16 dilution of guinea pig immune serum show somewhat more of the antigenic factor in fraction A than in fraction B, and more in the original yolk sac than in either of the fractions (table 1).

TABLE 1.—*Complement-fixation tests on whole yolk-sac suspensions and on fractions A and B*

Strain		Undiluted	Dilutions of fractions					
			1:2	1:4	1:8	1:16	1:32	1:64
K84.....	Fraction A.....	4	4	4	4	3	-----	-----
	Fraction B.....	4	4	4	4	2	-----	-----
K85.....	Yolk-sac suspension.....	4	4	4	4	4	Not tested	
	Fraction A.....	4	4	4	4	4	4	2
	Fraction B.....	4	4	4	4	4	Not tested	
K86.....	Yolk-sac suspension.....	4	4	4	4	4	3	1—
	Fraction A.....	4	4	4	4	4	1	0
	Fraction B.....	4	4	4	3	0	0	0
K88.....	Yolk-sac suspension.....	4	4	4	4	4	4	4
	Fraction A.....	4	4	4	4	4	4	0
	Fraction B.....	4	4	4	4	4	1	0
K89.....	Yolk-sac suspension.....	4	4	4	4	4	4	4
	Fraction A.....	4	4	4	4	4	2	0
	Fraction B.....	4	4	4	4	4	1	0

*Fraction A.*—Fraction A is reddish in color and though it appears only slightly turbid it may contain a considerable amount of precipitable substance, probably finely divided tissue which is not visible to the naked eye or even with a hand lens. Treatment for the removal of this precipitable substance will be considered later.

*Fraction B.*—To the tissue fraction remaining in each of the containers after the preliminary centrifugation is added a small amount of salt solution containing 0.01 percent merthiolate or 0.1 percent formalin. This is subjected to vigorous mixing by repeated suction and the blowing of air bubbles into the suspension by means of a 5- or 10-cc. pipette with a rubber bulb attached. The various precipitates are combined and sufficient saline added so that the volume is twice the original volume of fraction A. This suspension is spun in the horizontal centrifuge for 15 minutes at 2,000 r. p. m. An alternative method consists in adding a volume of salt solution to the precipitate, equal to that of fraction A, and spinning this in the horizontal centrifuge for 15 minutes at 2,000 r. p. m. The supernatant fluid is removed, the mixing repeated, and salt solution equal to fraction A again added. After again centrifuging for 15 minutes at 2,000 r. p. m. the two supernatant fluids are combined. The precipitate is discarded and the supernatant fluid spun in the angle centrifuge at 4,000 r. p. m. for 2 hours.

The precipitate from the 2-hour spinning of the supernatant fluid of fraction B in the angle centrifuge is then added to fraction A. This mixture is spun in the horizontal centrifuge for 2 minutes at 2,000 r. p. m. The resultant supernatant fluid appears somewhat turbid and is given further treatment as described below. The precipitate from this light centrifugation is discarded.

Further purification is effected by means of isoelectric precipitation of suspended material employing a modification of the method of de Léon (2). A preliminary titration is made with 5-cc. amounts of the mixture of A and precipitate B. Normal acetic acid or hydrochloric acid is added in hundredths and thousandths using a 0.1-cc. pipette graduated in thousandths. The tubes are incubated in the 37° C. water bath for 5 to 10 minutes. The end point is that pH at which floccules appear. The tube is spun for 1 to 2 minutes in the horizontal centrifuge at 2,000 r. p. m. The resultant supernatant fluid is transparent and almost water clear but somewhat brownish in color. The reaction of the total volume is adjusted in accordance with the results of the titration, and the process of removing the suspended tissue repeated as with the small sample. The hydrogen ion concentration is then reduced to pH 7.0 by the addition of normal sodium hydroxide.

A number of antigens have been prepared following the procedure outlined, or with minor modifications. Illustrations of the results of tests for complement-fixing activity of the various fractions are shown in tables 2, 3, and 4. The tests on all the fractions are shown in table 2 and on the significant fraction in tables 3 and 4. A diagrammatic outline of the procedure used is shown in table 5.

TABLE 2.—*Fractionation of 20-percent suspension of infected yolk sac (Karp strain)*

	Dilutions of Antigen					Antigen controls	
	Undiluted	1:2	1:4	1:8	1:16	Undiluted	1:2
1. K85 20-percent infected yolk sac.....	4	4	4	4	4	0	0
2. K85A aqueous layer (fraction A) after ether treatment.....	4	4	4	4	4	0	0
3. K85B tissue layer (fraction B after ether treatment) suspended, in volume of saline equal to A.....	4	4	4	4	4	1	0
4. K85B supernate 1 (after spinning in horizontal centrifuge).....	4	4	4	4	2	0	0
5. K85B supernate 2 (after spinning in horizontal centrifuge).....	0	0	0	0	0	0	0
6. K85B precipitate of No. 3 after spinning in horizontal centrifuge and suspended in volume of saline equal to A.....	4	1	0	0	0	4	1
7. K85A to which has been added precipitate from 4 and 5 after spinning in angle centrifuge for 2 hours.....	4	4	4	4	4	0	0
8. Supernate of No. 7 after spinning for 2 minutes at 2,000 r. p. m.....	4	4	4	4	4	0	0
9. Precipitate of No. 7 after spinning for 2 minutes at 2,000 r. p. m. suspended in volume of saline equal to No. 7.....	0	0	0	0	0	0	0
10. Supernate of No. 9 after adjusting reaction to isoelectric point for precipitating tissue and spinning in horizontal centrifuge for 2-3 minutes.....	4	4	4	4	4	0	0
11. Precipitate from No. 8 suspended in volume of saline equal to 8.....	4	0	0	0	0	0	0

TABLE 3.—*Fractionation of antigen K84 (Karp strain)*

	Dilutions of antigen					Antigen controls	
	Undiluted	1:2	1:4	1:8	1:16	Undiluted	1:2
1. Aqueous layer A.....	4	4	4	4	3	1	0
2. Tissue layer B in volume of saline equal to A.....	4	4	4	4	2	1	0
3. Aqueous layer A <sup>1</sup> plus precipitated rickettsiae from supernate of No. 2.....	4	4	4	4	3	1	0
4. Supernate of No. 3 <sup>2</sup> when pH was adjusted to the isoelectric point for precipitating suspended tissue and then adjusted to pH 7.0.....	4	4	4	4	4	0	0

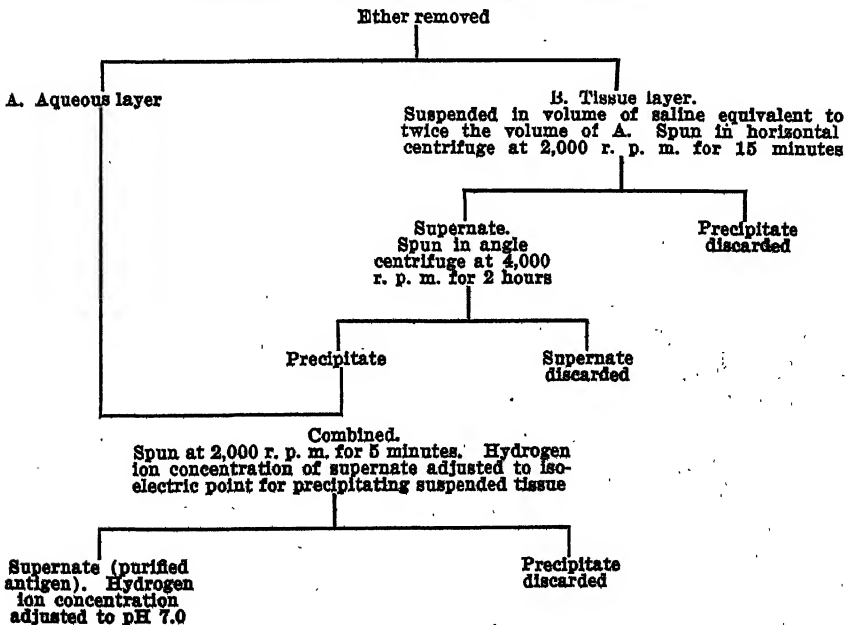
<sup>1</sup> Total solids per cubic centimeter 0.0146 gm. after subtracting NaCl. Total N per cubic centimeter 0.00209 gm.

<sup>2</sup> Total solids per cubic centimeter 0.0100 gm. after subtracting NaCl. Total N per cubic centimeter 0.00147 gm.

(Chemical determination by Senior Biochemist Mary E. Maver, National Cancer Institute.)

TABLE 4.—*Fractionation of antigen K86 (Karp strain)*

	Dilutions of antigen							Antigen controls	
	Undiluted	1:2	1:4	1:8	1:16	1:32	1:64	Undiluted	1:2
1. Original 20 percent yolk-sac suspension.....	4	4	4	4	4	3	1—	1	0
2. Aqueous layer A.....	4	4	4	4	4	1	0	tr	0
3. Tissue layer B in volume of saline equal to A.....	4	4	4	3	0	0	0	0	0
4. Aqueous layer A plus precipitated rickettsiae from supernate of No. 2.....	4	4	4	4	4	2	1—	0	0
5. Supernate of No. 4 when pH was adjusted to the isoelectric point for precipitating suspended tissue and then adjusted to pH 7.0.....	4	4	4	4	4—	1	0	0	0

TABLE 5.—*20-percent infected yolk-sac suspension plus an equal volume of diethyl ether spun at 2,000 r. p. m. for 15 minutes*

The amount of antigen recovered varies. Since the intervals between the amounts employed in the titrations are twofold, or 100 percent, the exact amount of recovery is difficult to determine. Titers of 1:8 and 1:16 have been obtained with some of the purified antigens. In tests to determine the complement-fixing activity of serums, dilutions of 1:2 and 1:4 of such antigens may therefore be employed, since four times the highest dilution in which complete fixation occurs is employed as the antigenic dose (3).

The total solids and nitrogen content of the two last phases of antigen K84 were determined. Before the isoelectric precipitation of suspended material, the total solids amounted to 0.0146 gm. per cubic centimeter after subtracting NaCl, and the nitrogen content per cubic centimeter was 0.00209 gm. After the final removal of suspended material total solids were 0.0100 gm. after subtracting NaCl, and nitrogen 0.00147 gm. per cubic centimeter.

By methods of differential centrifugation the complement-fixing antigenic fraction of suspensions of tsutsugamushi (scrub typhus) infected yolk sac has been freed of the greater part of the extraneous tissue present. Further purification has been effected by adjusting the reaction to the isoelectric point for precipitating suspended tissue. The resultant water-clear brownish fluid contains the greater part of the antigenic fraction, as no great reduction in the complement-fixation titer occurred.

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<sup>2</sup> AUTHOR'S NOTE.—(Since the date of assignment for publication of this article (Mar. 23, 1945) further work on the testing of serums by complement fixation indicates that more conclusive results are obtained when fraction A is employed as antigen without attempts at further purification. A 33½-percent suspension of infected yolk sac after grinding in a Waring Blendor and standing overnight, is treated with equal parts of anhydrous ether in a centrifuge bottle, shaken, and immediately centrifuged. The aqueous layer is removed and employed as antigen. (Pub. Health Rep., 16, 1483-1488 (1945)).

**DEATHS DURING WEEK ENDED AUG. 31, 1946**

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 31, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	7, 918	8, 549
Average for 3 prior years.....	8, 032	
Total deaths, first 35 weeks of year.....	321, 066	316, 985
Deaths under 1 year of age.....	730	638
Average for 3 prior years.....	621	
Deaths under 1 year of age, first 35 weeks of year.....	22, 309	21, 211
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67, 282, 680	67, 351, 591
Number of death claims.....	10, 800	13, 990
Death claims per 1,000 policies in force, annual rate.....	8. 2	10. 8
Death claims per 1,000 policies, first 35 weeks of year, annual rate.....	9. 8	10. 4



# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 7, 1946

#### Summary

For the 3rd consecutive week the incidence of poliomyelitis for the country as a whole declined slightly. A total of 1,726 cases was reported, as compared with 1,780 last week, 1,498 for the same week in 1944, and a 5-year (1941-45) median of 891. Increases were recorded in the New England, Middle Atlantic, West North Central, South Atlantic, and West South Central areas. Of 41 States reporting 5 or more cases, 19 reported an increase (457 to 649), 16 a decrease (1,229 to 991) and 6 reported the same numbers (totaling 71) for each week. The 25 States showing changes and reporting 15 or more cases are as follows (last week's figures in parentheses): *Increases*—New York 101 (89), Pennsylvania 20 (14), Ohio 52 (43), Indiana 47 (27), Iowa 30 (24), Missouri 120 (63), South Dakota 45 (22), Kansas 50 (48), Florida 16 (10), Mississippi 21 (20), Arkansas 33 (23), Oklahoma 33 (14), Texas 25 (23), New Mexico 15 (11); *decreases*—Massachusetts 16 (18), New Jersey 15 (21), Illinois 199 (201), Michigan 55 (87), Wisconsin 130 (184), Minnesota 199 (208), North Dakota 66 (74), Nebraska 40 (51), Tennessee 16 (18), Colorado 72 (77), California 146 (218).

The total for the year to date is 14,154, as compared with a 5-year median of 6,792 and 10,972 for the corresponding period in 1944, in which year was recorded the previously largest number for the corresponding period of any year since 1916, when 17,375 cases were reported for the first 8 months of the year.

A total of 221 cases of diphtheria was reported, as compared with 193 last week, 239 for the next earlier week, 410 for the corresponding week last year, and a 5-year median of 321. The total to date is 10,555, as compared with 9,304 for the corresponding period last year and a 5-year median of 8,192.

For the second consecutive week no case of smallpox was reported in the United States. To date 279 cases have been reported, as compared with 275 for the same period last year.

Deaths recorded for the week in 93 large cities of the United States totaled 7,912, as compared with 7,918 last week, 8,120 and 7,673, respectively, for the corresponding weeks of 1945 and 1944, and a 5-year (1943-45) average of 7,807. The cumulative figure is 328,978, as compared with 325,105 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Sept. 7, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Sept. 7, 1946	Sept. 8, 1945		Sept. 7, 1946	Sept. 8, 1945		Sept. 7, 1946	Sept. 8, 1945		Sept. 7, 1946	Sept. 8, 1945	
NEW ENGLAND												
Maine	4	0	0				5	3	4	1	1	
New Hampshire	0	0	0							0	0	
Vermont	1	2	1				12	1	4	0	0	
Massachusetts	8	3	2				42	28	34	0	0	
Rhode Island	0	0	0	1	23		17		4	0	2	
Connecticut	1	0	0				10	2	10	2	3	
MIDDLE ATLANTIC												
New York	8	13	6	14	12	11	86	10	36	3	6	
New Jersey	5	4	3			2	22	14	20	1	2	
Pennsylvania	5	2	4	1	1	1	49	31	31	4	4	
EAST NORTH CENTRAL												
Ohio	13	6	6		2	5	31	7	12	2	6	
Indiana	4	5	5		2	1	2	6	6	1	3	
Illinois	9	4	7	1	9	3	9	54	33	4	5	
Michigan	6	9	3				22	18	18	1	2	
Wisconsin	1	2	0	2	9	10	24	20	54	1	2	
WEST NORTH CENTRAL												
Minnesota	5	8	6				2	6	6	0	1	
Iowa	4	0	2				12		3	1	0	
Missouri	5	2	3	1			7	6	6	4	1	
North Dakota	0	5	1							0	0	
South Dakota	1	6	4				3	2	2	2	1	
Nebraska	1	1	1	6	5	3	3	3	3	1	0	
Kansas	8	5	3	2		2	6	6	3	0	1	
SOUTH ATLANTIC												
Delaware	0	0	0					1	1	0	0	
Maryland	4	12	1	3	1	1	1	7	9	1	1	
District of Columbia	0	0	0						4	0	0	
Virginia	7	11	12	90	119	119	18	3	10	2	1	
West Virginia	4	9	8	1		2	2	1	3	2	0	
North Carolina	7	41	34				5	1	10	1	2	
South Carolina	2	33	25	49	176	142		5	11	0	1	
Georgia	14	26	23	9	3	11	2	1	2	0	1	
Florida	8	5	5	2			5	1	4	1	1	
EAST SOUTH CENTRAL												
Kentucky	5	35	5					9	6	2	3	
Tennessee	3	14	14	9	7	3	1		4	0	1	
Alabama	8	14	30	22	14	9	3		2	1	3	
Mississippi	8	27	10							0	2	
WEST SOUTH CENTRAL												
Arkansas	5	10	10	9	4	4	3	5	5	1	0	
Louisiana	4	8	5	2	139	5	5	2	2	0	1	
Oklahoma	1	6	6	2	7	7		3	3	0	1	
Texas	16	50	32	186	433	356	19	38	25	1	5	
MOUNTAIN												
Montana	0	0	0		5	1	16		2	0	2	
Idaho	1	2	0	6	4		2	22		0	6	
Wyoming	0	0	0				6	2	4	0	0	
Colorado	3	0	8	7	3	4	9	3	5	0	2	
New Mexico	3	2	2				8	2	2	0	0	
Arizona	7	2	1	12	11	21	11	2	2	0	0	
Utah	0	0	0				6	37	9	1	1	
Nevada	0	0	0							0	0	
PACIFIC												
Washington	3	6	3				8	27	11	1	0	
Oregon	1	2	1	3		2	9	13	13	0	0	
California	18	19	16	2	16	10	38	59	59	6	5	
Total	221	410	321	431	688	707	543	465	527	45	73	73
36 weeks	10,555	9,304	8,162	153,479	73,298	83,394	940,638	106,024	540,027	4,616	5,402	5,402

1 New York City only.

\* Period ended earlier than Saturday.

*Telegraphic morbidity reports from State health officers for the week ended Sept. 7, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.*

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Sept. 7, 1946	Sept. 8, 1945		Sept. 7, 1946	Sept. 8, 1945		Sept. 7, 1946	Sept. 8, 1945		Sept. 7, 1946	Sept. 8, 1945	
NEW ENGLAND												
Maine.....	1	10	2	8	23	7	0	0	0	0	0	0
New Hampshire.....	7	1	1	0	5	2	0	0	0	0	0	0
Vermont.....	2	8	3	1	0	2	0	0	0	0	0	2
Massachusetts.....	16	30	23	31	41	48	0	0	0	1	0	2
Rhode Island.....	7	1	1	1	0	2	0	0	0	0	0	0
Connecticut.....	8	9	9	0	4	8	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York.....	101	114	71	59	92	59	0	0	0	14	8	12
New Jersey.....	15	60	32	12	10	13	0	0	0	2	2	8
Pennsylvania.....	20	62	62	32	38	38	0	0	0	6	12	12
EAST NORTH CENTRAL												
Ohio.....	52	33	33	7	63	61	0	0	0	7	7	7
Indiana.....	47	28	16	18	12	15	0	0	0	3	2	4
Illinois.....	199	131	45	39	50	44	0	1	0	2	4	5
Michigan.....	55	11	11	18	36	32	0	0	0	4	1	3
Wisconsin.....	130	19	14	29	47	38	0	1	0	0	0	1
WEST NORTH CENTRAL												
Minnesota.....	199	17	17	11	11	18	0	0	0	0	0	0
Iowa.....	30	9	9	6	19	16	0	0	0	1	2	2
Missouri.....	120	31	14	10	18	18	0	0	0	1	3	7
North Dakota.....	66	5	4	4	6	2	0	0	0	0	0	0
South Dakota.....	45	1	1	1	0	4	0	0	0	0	0	0
Nebraska.....	40	7	8	9	10	6	0	0	0	1	0	0
Kansas.....	50	13	7	5	18	18	0	0	0	0	2	2
SOUTH ATLANTIC												
Delaware.....	2	3	1	2	2	2	0	0	0	1	1	1
Maryland.....	9	5	5	14	15	11	0	0	0	0	5	2
District of Columbia.....	3	4	4	4	3	3	0	0	0	0	0	0
Virginia.....	4	30	15	14	68	23	0	0	0	0	10	10
West Virginia.....	5	9	9	22	53	32	0	0	0	1	1	5
North Carolina.....	8	11	11	20	30	36	0	0	0	0	7	7
South Carolina.....	0	6	4	1	9	9	0	0	0	2	3	3
Georgia.....	8	3	3	5	8	12	0	0	0	3	10	5
Florida.....	16	0	0	2	3	3	0	0	0	1	9	1
EAST SOUTH CENTRAL												
Kentucky.....	3	4	8	27	14	14	0	0	0	1	10	11
Tennessee.....	16	30	13	19	30	28	0	0	0	7	36	18
Alabama.....	6	4	4	8	19	19	0	0	0	2	2	2
Mississippi.....	21	1	4	3	9	9	0	0	0	2	4	8
WEST SOUTH CENTRAL												
Arkansas.....	33	5	1	3	6	4	0	0	0	0	7	7
Louisiana.....	16	7	5	3	13	4	0	0	0	5	2	15
Oklahoma.....	33	10	1	4	11	11	0	0	0	2	6	6
Texas.....	25	30	11	23	46	20	0	0	0	6	10	21
MOUNTAIN												
Montana.....	5	7	1	8	2	4	0	0	0	0	2	0
Idaho.....	5	1	0	3	3	3	0	0	0	0	4	1
Wyoming.....	5	2	2	2	3	1	0	0	0	2	0	0
Colorado.....	72	23	6	9	6	14	0	0	0	4	0	2
New Mexico.....	15	1	1	5	3	2	0	0	0	0	3	2
Arizona.....	7	1	1	3	0	1	0	0	0	1	1	2
Utah.....	13	23	4	0	6	3	0	0	0	0	1	0
Nevada.....	0	1	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	28	33	7	9	20	17	0	0	0	1	1	1
Oregon.....	12	7	7	11	7	7	0	0	0	1	2	2
California.....	146	30	12	39	87	42	0	0	0	9	5	4
Total.....	1,726	891	891	564	979	804	0	2	2	101	185	194
36 weeks.....	14,154	7,047	6,792	88,476	137,174	100,121	279	275	618	2,886	3,296	3,849

\* Period ended earlier than Saturday.

\* Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 1; New York 1; New Jersey 2; Ohio 1; Michigan 3; Georgia 1; Tennessee 1; Louisiana 1; Texas 1; California 4.

\* Corrected report: Pollomyelitis, Georgia, week ended August 24, 14 cases (instead of 15).

Telegraphic morbidity reports from State health officers for the week ended Sept. 7, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Sept. 7, 1946								
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever	
	Sept. 7, 1946	Sept. 8, 1945		Ame- bic	Bacil- lary	Un- spec- ified						
NEW ENGLAND												
Maine.....	3	20	16									
New Hampshire.....	5											
Vermont.....	10	24	24								2	
Massachusetts.....	113	146	81		1							
Rhode Island.....	18	20	20									
Connecticut.....	29	43	43								1	
MIDDLE ATLANTIC												
New York.....	126	296	270	2	3						3	
New Jersey.....	139	144	116					1			1	
Pennsylvania.....	148	122	128								8	
EAST NORTH CENTRAL												
Ohio.....	79	221	160	1			1	3			2	
Indiana.....	82	25	26	1			5	2	1		7	
Illinois.....	139	139	171	4	1		2	1	1		6	
Michigan <sup>1</sup> .....	125	93	190								5	
Wisconsin.....	185	63	184								3	
WEST NORTH CENTRAL												
Minnesota.....	9	28	48	3					1		3	
Iowa.....	31	6	19	2			1				3	
Missouri.....	16	12	14				2		1		5	
North Dakota.....	6	2	6				2					
South Dakota.....	5	9	9									
Nebraska.....	4		12				1				2	
Kansas.....	23	28	28				2		1		12	
SOUTH ATLANTIC												
Delaware.....	7							1				
Maryland <sup>1</sup> .....	43	32	47					1			1	
District of Columbia.....	3	7	9					1				
Virginia.....	35	51	51			47		7	1		2	
West Virginia.....	57	10	11									
North Carolina.....	54	43	80					1	2	2		
South Carolina.....	15	73	67							2		
Georgia.....	4	32	20	4	6	1			2	17	2	
Florida.....	25	6	5	1						18	2	
EAST SOUTH CENTRAL												
Kentucky.....	16	44	40		5				1			
Tennessee.....	16	22	34		2				3	2	3	
Alabama.....		3	8				2			11	1	
Mississippi <sup>1</sup> .....										1	1	
WEST SOUTH CENTRAL												
Arkansas.....	12	8	14	6	3		1		3	1	5	
Louisiana.....	12	8	4							5	1	
Oklahoma.....	19	13	8				1	2				
Texas.....	119	184	127	11	162	22				29	11	
MOUNTAIN												
Montana.....	3		7									
Idaho.....	2	4	3						1		3	
Wyoming.....	4	1	6				1		1			
Colorado.....	18	57	57						1		1	
New Mexico.....	9	1	6		1	4						
Arizona.....	2	4	3			18						
Utah <sup>1</sup> .....	8	11	15									
Nevada.....												
PACIFIC												
Washington.....	30	26	25								1	
Oregon.....	4	8	17	1								
California.....	36	105	105	3	2					1	3	
Total.....	1,798	2,187	2,491	89	186	92	21	20	19	84	95	
Same week, 1945.....	2,137			42	797	571	19	18	11	189	77	
Average, 1943-45.....	2,094			44	580	449	21	* 12	12	* 194		
36 weeks: 1946.....	70,100			2,084	11,942	4,884	446	* 498	666	2,280	2,540	
1945.....	91,006			1,818	18,020	7,554	355	404	550	3,182	3,330	
Average, 1943-45.....	98,742		* 180,991	1,340	15,073	6,400	439	* 406	529	* 2,628		

<sup>1</sup> Period ended earlier than Saturday.      \* 5-year median, 1941-45.

<sup>2</sup> Delayed report: Rocky Mountain spotted fever, Maryland, 2 cases, included in cumulative total only.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 31, 1946

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococ- cus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	---	0	---	0	0	0	0	0	0	1
New Hampshire:												
Concord.....	0	0	---	0	---	0	0	0	0	0	0	0
Vermont:												
Barre.....	0	0	---	0	---	0	0	0	0	0	0	0
Massachusetts:												
Boston.....	7	0	---	0	8	0	0	9	7	0	0	26
Fall River.....	0	0	---	0	---	0	0	0	0	0	0	3
Springfield.....	0	0	---	0	3	0	0	1	1	0	1	13
Worcester.....	0	0	---	0	3	0	4	4	1	0	0	37
Rhode Island:												
Providence.....	0	0	1	0	11	0	0	0	0	0	0	9
Connecticut:												
Bridgeport.....	0	0	---	0	---	0	0	0	0	0	0	---
Hartford.....	1	0	---	0	---	0	0	0	1	0	0	3
New Haven.....	0	0	---	0	1	0	1	0	0	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo.....	3	0	---	0	---	0	1	1	2	0	0	6
New York.....	7	0	15	0	21	2	34	46	17	0	16	44
Rochester.....	0	0	---	0	---	0	1	2	3	0	1	---
Syracuse.....	0	0	---	0	---	0	2	4	1	0	0	1
New Jersey:												
Camden.....	0	0	---	0	---	0	1	0	0	0	0	4
Newark.....	0	0	---	0	2	0	1	2	3	0	0	25
Trenton.....	0	0	---	0	3	0	1	0	0	0	1	7
Pennsylvania:												
Philadelphia.....	3	0	---	0	14	0	15	3	6	0	2	25
Pittsburgh.....	0	0	---	0	5	0	5	6	4	0	0	2
Reading.....	0	0	---	0	---	0	0	0	1	0	0	10
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	2	0	---	0	---	0	10	0	3	0	0	4
Cleveland.....	0	0	---	0	19	2	8	22	11	0	0	23
Columbus.....	2	0	---	0	1	0	4	1	6	0	0	1
Indiana:												
Fort Wayne.....	0	0	---	0	---	0	0	0	0	0	0	---
Indianapolis.....	2	1	---	0	---	0	1	10	4	0	0	18
South Bend.....	0	0	---	0	1	0	0	2	1	0	0	---
Terre Haute.....	0	0	---	0	---	0	0	0	0	0	0	2
Illinois:												
Chicago.....	2	0	---	0	4	1	3	58	15	0	0	30
Michigan:												
Detroit.....	1	0	---	0	---	0	5	31	3	0	0	38
Flint.....	0	0	---	0	---	0	0	2	1	0	2	5
Grand Rapids.....	0	0	---	0	1	0	0	2	1	0	0	20
Wisconsin:												
Kenosha.....	0	0	---	0	---	0	0	11	0	0	0	---
Milwaukee.....	0	0	---	0	5	0	4	13	3	0	0	135
Racine.....	0	0	---	0	2	0	0	5	4	0	0	4
Superior.....	4	0	---	0	---	0	0	3	0	0	0	7
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	4	0	---	0	---	0	0	13	0	0	0	---
Minneapolis.....	0	0	---	0	1	0	4	20	1	0	0	---
St. Paul.....	1	0	---	0	1	0	3	22	2	0	0	1
Missouri:												
Kansas City.....	0	0	---	0	---	1	5	9	0	0	0	---
St. Joseph.....	0	0	---	0	---	1	0	1	0	0	0	---
St. Louis.....	1	1	---	0	1	1	6	32	0	0	1	12

## City reports for week ended Aug. 31, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, me- ningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL— continued												
North Dakota:												
Fargo.....	0	0	—	0	—	0	0	17	0	0	0	1
Nebraska:												
Omaha.....	1	0	—	0	—	1	1	20	0	0	0	—
Kansas:												
Topeka.....	0	0	—	0	—	0	0	1	0	0	0	7
Wichita.....	0	0	—	0	—	0	4	4	0	0	0	5
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	—	0	1	1	1	1	1	0	0	1
Maryland:												
Baltimore.....	3	1	—	0	5	1	5	2	2	0	0	35
Cumberland.....	0	0	—	0	—	0	0	0	0	0	0	1
Frederick.....	0	0	—	0	—	0	0	0	0	0	0	—
District of Columbia:												
Washington.....	0	0	—	0	2	4	4	4	2	0	3	20
Virginia:												
Lynchburg.....	0	0	—	0	—	0	3	0	1	0	0	—
Richmond.....	0	0	20	0	4	0	0	2	6	0	0	2
Roanoke.....	2	0	—	0	—	0	0	0	0	0	0	—
West Virginia:												
Wheeling.....	0	0	—	0	—	0	2	1	0	0	0	2
North Carolina:												
Raleigh.....	0	0	—	0	—	0	0	0	0	0	0	3
Wilmington.....	0	0	—	0	—	0	0	0	1	0	0	—
Winston-Salem.....	0	0	—	0	1	0	0	0	1	0	0	6
South Carolina:												
Charleston.....	0	0	—	0	1	0	3	0	0	0	0	—
Georgia:												
Atlanta.....	1	0	4	0	—	0	0	0	1	0	0	4
Brunswick.....	0	0	—	0	—	0	0	1	0	0	0	—
Savannah.....	0	0	—	0	1	0	0	0	0	0	1	—
Florida:												
Tampa.....	1	0	—	0	—	0	0	1	0	0	0	—
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	1	0	5	0	5	5	1	0	0	2
Nashville.....	0	0	—	0	—	0	3	1	0	0	0	1
Alabama:												
Birmingham.....	0	0	3	0	—	0	2	12	0	0	0	—
Mobile.....	2	0	1	0	1	0	3	1	0	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	—	0	—	0	1	0	0	0	0	—
Louisiana:												
New Orleans.....	2	0	—	0	1	0	2	2	0	0	1	—
Shreveport.....	0	0	—	0	—	0	6	1	0	0	1	—
Texas:												
Dallas.....	0	0	—	0	—	0	0	3	1	0	0	3
Galveston.....	0	0	—	0	—	0	1	0	0	0	0	—
Houston.....	0	0	—	0	—	0	4	0	6	0	1	1
San Antonio.....	0	0	—	0	—	0	2	0	2	0	1	1
MOUNTAIN												
Montana:												
Billings.....	0	0	—	0	—	0	0	0	0	0	0	—
Great Falls.....	0	0	—	0	3	0	0	1	0	0	0	—
Helena.....	0	0	—	0	—	0	0	1	0	0	0	—
Missoula.....	0	0	—	0	—	0	0	1	0	0	0	—
Idaho:												
Boise.....	0	0	—	0	—	0	0	0	0	0	0	2
Colorado:												
Denver.....	0	0	—	0	3	0	4	17	4	0	0	7
Pueblo.....	0	0	—	0	2	0	0	4	0	0	0	—
Utah:												
Salt Lake City.....	0	0	—	0	—	0	0	2	4	0	0	2

## City reports for week ended Aug. 31, 1946—Continued

	Diphtheria cases	Encephalitis, infections, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
<b>PACIFIC</b>												
Washington:												
Seattle	6	0	—	0	1	0	2	7	4	0	1	6
Spokane	0	0	—	0	2	0	1	4	0	0	0	—
Tacoma	1	0	—	0	—	0	0	0	1	0	0	—
California:												
Los Angeles	3	0	—	0	3	0	3	98	11	0	2	6
Sacramento	2	0	—	0	1	0	0	1	0	0	0	—
San Francisco	2	0	—	0	5	2	8	3	3	0	2	4
Total	67	3	45	0	149	17	194	560	154	0	37	739
Corresponding week, 1945	46	—	27	8	168	—	217	—	180	0	24	730
Average, 1941-45	45	—	25	17	163	—	217	—	208	0	33	921

<sup>1</sup> 3-year average, 1943-45.

<sup>2</sup> 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: Buffalo 1; New York 11; Indianapolis 1; Chicago 3; Los Angeles 2.

*Dysentery, bacillary.*—Cases: New York 2; Philadelphia 1; Chicago 1; Charleston, S. C. 2; Los Angeles 2.

*Dysentery, unspecified.*—Cases: San Antonio 4.

*Rocky Mountain spotted fever.*—Cases: Lynchburg 1.

*Typhus fever, endemic.*—Cases: Tampa 3; Nashville 2; Mobile 1; New Orleans 2; Shreveport 1; Galveston 1; Houston 1; San Antonio 2.

*Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1943, 34,245,600)*

	Diphtheria case rates	Encephalitis, infections, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	20.9	0.0	2.6	0.0	68	0.0	13.1	36.6	26	0.0	2.6	246
Middle Atlantic	6.0	0.0	6.9	0.0	21	0.9	28.2	28.6	17	0.0	9.3	57
East North Central	8.0	0.6	0.0	0.0	20	1.3	34.5	98.1	32	0.0	1.2	237
West North Central	13.9	2.0	0.0	0.0	6	9.0	45.8	294.4	6	0.0	2.0	52
South Atlantic	11.7	1.7	40.2	0.0	25	10.0	30.1	20.1	25	0.0	6.7	124
East South Central	17.7	0.0	29.5	0.0	35	0.0	76.7	112.1	6	0.0	0.0	18
West South Central	5.7	0.0	0.0	0.0	3	0.0	45.9	17.2	26	0.0	11.5	14
Mountain	0.0	0.0	0.0	0.0	64	0.0	31.8	206.5	64	0.0	0.0	87
Pacific	22.1	0.0	0.0	0.0	19	3.2	22.1	175.5	30	0.0	7.9	25
Total	10.2	0.5	6.9	0.0	23	2.6	29.6	85.5	24	0.0	5.6	113

## TERRITORIES AND POSSESSIONS

## Panama Canal Zone

*Notifiable diseases—July 1946.*—During the month of July 1946, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox.....	3	—	3	—	1	—	2	—	9	—
Diphtheria.....	9	—	—	—	—	—	6	—	15	—
Dysentery:										
Amebic.....	—	—	1	—	—	—	7	—	8	—
Bacillary.....	1	—	—	—	2	—	2	—	5	—
Leprosy.....	—	—	—	—	—	—	—	1	—	1
Malaria <sup>1</sup> .....	8	1	3	—	43	—	35	3	89	4
Measles.....	158	5	7	—	44	—	46	—	255	5
Mumps.....	—	—	—	—	6	—	1	—	7	—
Paratyphoid fever.....	2	—	—	—	1	—	1	—	4	—
Pneumonia.....	—	16	—	4	46	1	—	9	46	30
Pollomyelitis.....	—	—	—	—	—	—	2	—	2	—
Tuberculosis.....	—	14	—	3	4	1	—	6	4	24
Typhoid fever.....	1	—	—	—	—	—	1	—	2	—
Whooping cough.....	—	—	—	—	2	—	—	—	2	—

<sup>1</sup> Exclusive of carriers.

<sup>2</sup> 10 recurrent cases.

<sup>3</sup> In the Canal Zone only.

## Puerto Rico

*Notifiable diseases—4 weeks ended August 10, 1946.*—During the 4 weeks ended August 10, 1946, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox.....	7	Syphilis.....	128
Diphtheria.....	53	Tetanus.....	6
Dysentery, unspecified.....	12	Tetanus, infantile.....	2
Gonorrhea.....	181	Tuberculosis (all forms).....	359
Influenza.....	73	Typhoid and paratyphoid fever.....	13
Malaria.....	281	Typhus fever (murine).....	14
Measles.....	9	Whooping cough.....	45
Pollomyelitis.....	26		



# FOREIGN REPORTS

## CANADA

*Provinces—Communicable diseases—Week ended August 17, 1946.*—During the week ended August 17, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		9		15	72	2	9	20	18	145
Diphtheria.....		1		42	2	2	2			50
Dysentery:										
Amebic.....								6		6
Bacillary.....									1	1
German measles.....								2	7	9
Influenza.....					1					1
Measles.....	1	12		66	38	26	98	40	6	287
Meningitis, meningococcus.....										
Mumps.....		1	1	10	2	1				4
Poliomyelitis.....	5		5	175	39	5	50	12	34	206
Scarlet fever.....	1	6	6	26	10	4	2	5	7	67
Tuberculosis (all forms).....		6	13	90	46	24	25	8	36	245
Typhoid and paratyphoid fever.....				18	1			1	2	22
Undulant fever.....				7	1					8
Venereal diseases:										
Gonorrhea.....		19	9	78	169		55	65	68	463
Syphilis.....		11	3	62	70		21	12	37	216
Other forms.....									1	1
Whooping cough.....		18		40	37	2		8	2	107

## CUBA

*Habana—Communicable diseases—4 weeks ended August 17, 1946.*—During the 4 weeks ended August 17, 1946, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox.....	1		Poliomyelitis.....	7	
Diphtheria.....	3		Tuberculosis.....	15	3
Malaria.....	9		Typhoid fever.....	22	9
Measles.....	3				

*Provinces—Notifiable disease—4 weeks ended August 10, 1946.*—During the 4 weeks ended August 10, 1946, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana <sup>1</sup>	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer.....	2	12	12	16	1	11	54
Chickenpox.....		1	1			2	4
Diphtheria.....	2	5		1			8
Hookworm disease.....				1			1
Leprosy.....		3				5	8
Malaria.....	5	6		2	5	28	46
Measles.....		10			2	1	13
Poliomyelitis.....	6	15	2	5			28
Tuberculosis (respiratory).....	3	46	15	50	28	42	184
Typhoid fever.....	34	68	11	123	53	63	352
Typhus fever (murine).....						1	1
Yaws (frambesia).....						1	1

<sup>1</sup> Includes the city of Habana.

## EGYPT

*Vital statistics—First quarter 1945.*—The following table shows the numbers of births and deaths registered for the first quarter of 1945 in all localities of Egypt having a health bureau:

Number of live births.....	83,603	Deaths per 1,000 population.....	27.1
Births per 1,000 population.....	88.2	Deaths under 1 year of age.....	10,481
Number of stillbirths.....	1,523	Deaths under 1 year of age per 1,000 live births..	125
Deaths, all ages.....	39,006		

## IRISH FREE STATE

*Vital statistics—First quarter 1946.*—The following table shows the numbers of marriages, births, and deaths in Irish Free State for the first quarter of 1946. The figures are provisional:

Number of marriages.....	4,480	Death from—Continued.	
Number of births.....	16,855	Diphtheria.....	46
Births per 1,000 population.....	22.5	Dysentery.....	1
Number of deaths.....	13,026	Influenza.....	408
Deaths per 1,000 population.....	17.4	Measles.....	15
Deaths under 1 year of age per 1,000 live births.....	81	Scarlet fever.....	2
Deaths from—		Tuberculosis (all forms).....	874
Cancer.....	—	Typhoid fever.....	11
Diarrhea and enteritis (under 2 years of age).....	239	Violence.....	—
		Whooping cough.....	34

Note.—Estimated population July 1, 1946, 2,992,000.

### WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, UNRRA, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

## CHOLERA

[O indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-June 1946	July 1946	August 1946—week ended—					
			3	10	17	24	31	
ASIA								
Burma.....	O	320	395	23				
Bassein.....	O	23	5	1				
Moulmein.....	O	44	10	7		7		
Rangoon.....	O	6	16		1			
Ceylon.....	O	41	34					
China:								
Anhui Province.....	O	31	522					
Chekiang Province.....	O	189	700					
Formosa, Island of.....	O	183						
Fukien Province.....	O	27	472					
Koochow.....	O	19	422					
Honan Province.....	O	40	440					
Hopeh Province.....	O		10		180			
Hunan Province.....	O	1	475					
Hupei Province.....	O	143	28					
Ichang Province.....	O	145	2					
Kiangsi Province.....	O		61		1805			
Kiangsu Province.....	O	1,935	3,785				1881	
Shanghai.....	O	1,987	2,468		1409			
Kwangsi Province.....	O	496	161					
Kwangtung Province.....	O	2,269	451		194			
Canton.....	O	1,681	250					
Hong Kong.....	O	330	107	17	17	11	10	

<sup>1</sup> For the period Aug. 1-10, 1946.

<sup>2</sup> Includes imported cases.

<sup>3</sup> For the period Aug. 1-20, 1946.

## CHOLERA—Continued

Place	January- June 1946	July 1946	August 1946—week ended—				
			3	10	17	24	31
ASIA—continued							
China—Continued.							
Kweichow Province	0	8					
Shantung Province	0			17			
Szechwan Province	0	40	25				
Yunnan Province	0		7				
India	0	52,237					
Calcutta	0	1,567	80	24			
Chittagong	0	8					
Madras	0	3					
India (French)	0	1					
Indochina (French):							
Cambodia	0	162	109				
Cochinchina	0	819					
Bien Hoa	0	24					
Chaudok	0	21					
Mytho	0	142					
Saigon-Cholon	0	35	1				1
Vinh-long	0	7					
Japan	0	209	155	128			
Malay States	0	27	184	15	4	2	2
Manchuria	0		3,085				
Mukden	0		27				
Siam (Thailand)	0	2,804	687	16			
Bangkok	0	387	10	6	5	2	4
Straits Settlements: Singapore	0	41					

\* Imported.

## PLAGUE

[C indicates cases; P, present]

AFRICA							
Algeria.....	0	2					
Bechuanaland.....	0	10					
Belgian Congo.....	0	4	13		17	16	13
British East Africa:							
Kenya.....	0	24			2		
Uganda.....	0	12					
Egypt.....	0	145	30	13	8	6	5
Alexandria.....	0	91	18	2	7	4	1
Ismailiya.....	0	20	2				3
Matarlya.....	0		2				
Port Said.....	0	4	10				
Suez.....	0	30	2	1	2		
Libya:							
Tripolitania—Plague-infected rats	0	1					
Madagascar.....	0	133	4		2		
Union of South Africa.....	0	1					
ASIA							
Burma.....	0	765	218	27			
Bassein.....	0	17	4				
Rangoon.....	0	128	13	1	1	2	2
China:							
Chekiang Province.....	0	216	109				
Formosa.....	0	5					
Fukien Province.....	0	3,190	491				
Amoy.....	0	250	45				
Foochow.....	0	1,069	203				
Kiangsi Province.....	0	113	9				
Kwangtung Province.....	0	397	4				
Yunnan Province.....	0	32	38				
India.....	0	12,155					
Indochina (French): Cochinchina.....	0	3	1		2		
Java.....	0	30	1		1		
Manchuria.....	0	152					
Mukden.....	0	39					
Palestine.....	0	16					
Siam (Thailand).....	0	18	1				

1 Includes 2 suspected cases.

2 Pneumonic.

## PLAGUE—Continued

Place	January- June 1946	July 1946	August 1946—week ended—				
			3	10	17	24	31
EUROPE							
Great Britain: Malta.....C	6						
Portugal: Azores.....C	15						
NORTH AMERICA							
Canada: Nova Scotia.....C		1					
SOUTH AMERICA							
Bolivia:							
Santa Cruz Department.....C	12						
Tarija Department—Plague-infected rats.....		P					
Ecuador:							
Chimborazo Province.....C	2						
Loja Province.....C	6						
Peru:							
Lambayeque Department.....C	11						
Lima Department.....C	19						
Piura Department.....C	14	1					
OCEANIA							
Hawaii Territory: Plague-infected rats...	5						

<sup>3</sup> Includes 2 pneumonic cases.

<sup>4</sup> Imported suspected case.

<sup>5</sup> Plague infection was also proved positive in Hawaii Territory on Feb. 5, 1946, in a pool of 29 rats, and on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice. Under date of July 3, 1946, plague infection was reported in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats. Under date of July 17, 1946, plague infection was reported in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats.

## SMALLPOX

[O indicates cases; P, present]

AFRICA							
Algeria.....C	170						
Basutoland.....C	27						
Belgian Congo.....C	1,103	133					
British East Africa:							
Kenya.....C	535	91	8	38			
Nyasaland.....C	233	26	12		14	10	23
Tanganyika.....C	3,978	123	115				
Uganda.....C	480	29	2	5			
Cameroon (French).....C	63	4					
Dahomey.....C	1,119	111		28			
Egypt.....C	367						
Eritrea.....C	12						
French Equatorial Africa.....C	154						
French Guinea.....C	768	27		24			
French West Africa: Dakar District.....C	39						
Gambia.....C	7						
Gold Coast.....C	751	26	1			13	
Ivory Coast.....C	968	77		39			
Libya.....C	68	48					21
Mauritania.....C	1						
Morocco (French).....C	1,819	18					
Morocco (Int. Zone).....C	175						
Morocco (Spanish).....C	5						
Mozambique.....C	4						
Nigeria.....C	5,019						
Niger Territory.....C	400	27		4			

<sup>1</sup> Includes alastrim.

<sup>2</sup> Includes delayed reports.

<sup>3</sup> For the period Aug. 1-10, 1946.

## SMALLPOX—Continued

[C indicates cases; P, present]

Place	January- June 1946	July 1946	August 1946—week ended—				
			3	10	17	24	31
AFRICA—continued							
Rhodesia:							
Northern.....	C 262	17					
Southern.....	C 1	1					1
Senegal.....	C 94						
Sierra Leone.....	C 361						
Somaland (Italian).....	C 1						
Sudan (Anglo-Egyptian).....	C 38	5	4		2	1	1
Sudan (French).....	1, 863	19		<sup>1</sup> 1			
Togo (French).....	C 144	14		<sup>1</sup> 22			
Tunisia.....	C 83						
Union of South Africa.....	C 127				P	P	
ASIA							
Arabia.....	C 1						
Burma.....	1, 513	73					
Ceylon.....	C 246						
China.....	C 602	66	29	20	9	19	
India.....	52, 894						
India (French).....	C 3						
Indochina (French).....	1, 290	307					
Iran.....	C 24						
Iraq.....	C 5						
Japan.....	17, 541	114	9				
Malay States.....	C 336	143	11	10	14		9
Palestine.....	C 2						
Rhodes, Island of.....	C 1						
Siam (Thailand).....	14, 653	838	66				
Straits Settlements.....	C 23	8			9	1	3
Syria and Lebanon.....	C 8						
Turkey (See Turkey in Europe).							
EUROPE							
Czechoslovakia.....	C 24						
France.....	C 14	1					
Germany.....	C 1						
Gibraltar.....	C 3						
Great Britain:							
England and Wales.....	C 53						
Malta (Island of).....	C 6						
Scotland.....	C 2						
Greece.....	C 114						
Italy.....	C 492						
Portugal.....	C 34	4					
Spain.....	C 14						
Turkey.....	C 16						
NORTH AMERICA							
Canada.....	C 2						
Guatemala.....	C 55	1					
Honduras.....	C 3	1					
Mexico.....	C 322	11					
SOUTH AMERICA							
Argentina.....	C 62	5					
Bolivia.....	C 452						
Brazil.....	C 116	16		1			
Colombia.....	C 556	31					
Ecuador.....	C 41	1					
Paraguay.....	C 252						
Peru.....	C 204						
Uruguay.....	C 18						
Venezuela.....	1 679	1 49	1 22				1 17
OCEANIA							
Hawaii Territory.....	C 71						

<sup>1</sup> Includes alastrim.<sup>2</sup> For the period Aug. 1-10, 1946.<sup>3</sup> Includes 1 imported case.<sup>4</sup> Imported.<sup>5</sup> Includes imported cases.<sup>6</sup> Off-shipping.

## TYPHUS FEVER\*

[C indicates cases; P, present]

Place	January- June 1946	July 1946	August 1946—week ended—				
			3	10	17	24	31
AFRICA							
Algeria.....	557	46					
Basutoland.....	6						
Belgian Congo <sup>1</sup> .....	2,101	116	9				
British East Africa: Kenya <sup>1</sup> .....	21						
Egypt.....	1,298	20	10		2		
Eritrea.....	364	101	5	21	17		
French West Africa: Dakar District.....	3						
Libya.....	67	5		1	3	1	
Morocco (French).....	3,388	165				260	
Morocco (Int. Zone).....	52						
Morocco (Spanish).....	1	8					
Nigeria.....	26						
Rhodesia, Northern.....	1						
Sierra Leone <sup>1</sup> .....	3						
Tunisia <sup>1</sup> .....	183						
Union of South Africa <sup>1</sup> .....	157				P	P	
ASIA							
Arabia <sup>2</sup> .....	1						
Burma <sup>1</sup> .....		1					
China.....	45	10	2			1	
India.....	284						
Indochina (French).....	9						
Iran.....	137						
Iraq.....	133	23	4	5	8		
Japan.....	29,939	507	63				
Malay States.....	3						
Palestine <sup>1</sup> .....	41						
Straits Settlements.....	1						
Syria and Lebanon.....	78						
Trans-Jordan.....	19	2					
Turkey (See Turkey in Europe).....							
EUROPE							
Albania.....	53						
Austria.....	30	4					
Belgium.....	3						
Bulgaria.....	923	23				3	
Czechoslovakia <sup>1</sup> .....	762	4					
France <sup>1</sup> .....	12	2					
Germany.....	1,854	3	3			2	
Great Britain: England and Wales.....	1						
Malta <sup>2</sup> .....	12						
Greece <sup>1</sup> .....	266	48	15	19	12	25	
Hungary.....	702	15		7	17		
Italy.....	6	2					
Netherlands.....	15						
Poland.....	2,990	59			26		
Portugal.....	3	1					
Rumania.....	7,167			60			
Spain.....	6	4					
Sweden <sup>1</sup> .....	1						
Turkey.....	1,073	30	5	7		16	
Yugoslavia.....	2,219						
NORTH AMERICA							
Costa Rica <sup>1</sup> .....	48	5		5	2		
Cuba <sup>1</sup> .....	13	8		1			
Guatemala.....	433						
Jamaica <sup>1</sup> .....	19	5					
Mexico.....	755	201					
Panama (Republic).....	2						
Puerto Rico <sup>1</sup> .....	45	18	3	1			
Virgin Islands <sup>1</sup> .....	2						

See footnotes at end of table.

## TYPHUS FEVER\*—Continued

Place	January- June 1946	July 1946	August 1946—week ended—							
			3	10	17	24	31			
SOUTH AMERICA										
Argentina.....	C	2	2	-----	-----	-----	-----	-----		
Bolivia.....	C	130	-----	-----	-----	-----	-----	-----		
Chile.....	C	181	38	-----	-----	-----	-----	-----		
Colombia.....	C	205	-----	-----	-----	-----	-----	-----		
Ecuador <sup>1</sup> .....	C	542	105	-----	-----	-----	-----	-----		
Paraguay.....	C	1	-----	-----	-----	-----	-----	-----		
Peru.....	C	334	-----	-----	-----	-----	-----	-----		
Venezuela <sup>1</sup> .....	C	70	3	-----	-----	-----	-----	-----		
OCEANIA										
Australia <sup>2</sup> .....	C	97	2	-----	-----	-----	-----	-----		
Hawaii Territory <sup>3</sup> .....	C	24	1	-----	1	3	-----	-----		

\* Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

<sup>1</sup> Include cases of murine type.

<sup>2</sup> For the period Aug. 1-20, 1946.

<sup>3</sup> Murine type.

## YELLOW FEVER

[C indicates cases; D, deaths]

AFRICA								
Ivory Coast: Bobo Dioulasso.....	C	-----	<sup>1</sup> 1	-----	-----	-----	-----	-----
Nigeria:								
Ibadan.....	C	1	-----	-----	-----	-----	-----	-----
Ilesha.....	C	-----	-----	-----	-----	-----	-----	<sup>1</sup> 2
Kafanchan.....	C	-----	<sup>1</sup> 2	-----	-----	-----	-----	-----
Ogbomosho.....	C	39	-----	-----	-----	-----	-----	-----
Oshogbo, <sup>2</sup> .....	C	-----	-----	-----	-----	-----	-----	-----
Sapele.....	C	-----	-----	-----	-----	-----	-----	<sup>1</sup> 5
Sierra Leone: Pujehun.....	C	1	-----	-----	-----	-----	-----	-----
SOUTH AMERICA								
Bolivia: Santa Cruz Department.....	D	<sup>2</sup> 40	-----	-----	-----	-----	-----	-----
Brazil: Para State.....	D	1	-----	-----	-----	-----	-----	-----
Colombia:								
Caqueta Territory.....	D	1	-----	-----	-----	-----	-----	-----
Magdalena Department.....	D	1	-----	-----	-----	-----	-----	-----
Santander Department.....	D	1	1	-----	-----	-----	-----	-----
Venezuela:								
Tachira State.....	C	4	-----	-----	-----	-----	-----	-----
Trujillo State.....	C	4	-----	-----	-----	-----	-----	-----
Zulia State.....	C	4	-----	-----	-----	-----	-----	-----

<sup>1</sup> Suspected.

<sup>2</sup> During the week ended Sept. 7, 1946, 1 case of suspected yellow fever was reported in Oshogbo, Nigeria.

<sup>3</sup> 14 of these deaths have been confirmed.

X

**FEDERAL SECURITY AGENCY**  
**United States Public Health Service**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

**G. ST. J. FERROTT, *Chief of Division***

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# Public Health Reports

**VOLUME 61    OCTOBER 4, 1946    NUMBER 40**

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**TUBERCULOSIS CONTROL ISSUE NO. 8**

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# Public Health Reports

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## EDITORIAL

### HEART DISEASE AND TUBERCULOSIS

Heart disease was the cause of 418,062 deaths in 1944, or 30 percent of all deaths reported for all ages in the United States. Tuberculosis was reported as the cause of 54,731 deaths, or 4 percent of all deaths in all age groups. Since 1934, deaths reported as caused by heart disease have increased from 303,724 to 418,062 in 1944—an increase of 38 percent over the annual deaths due to heart disease in 1934. In the same period, tuberculosis deaths declined from 71,609 in 1934 to 54,731 in 1944—a decrease of 24 percent.

This seems to indicate that heart disease is increasing in significance as a cause of death in the population as a whole, while tuberculosis is declining in significance. This is true for the entire population, on the basis of reported deaths, provided that these figures do not lead us into a misconception of the relative importance of tuberculosis as a cause of death among certain age groups. A study of data on age specific death rates discloses that, contrary to the impression given when deaths among people of all ages are considered, tuberculosis still stands out as a leading cause of death among the most important age group of the population—persons between 15 and 44 years of age. Here it is noted that tuberculosis was reported as the cause of death in 26,942 cases while diseases of the heart were reported as the cause of 25,705 deaths out of a total of 185,131. There has been no change in this relationship since 1943.

Any consideration of deaths in the total population may indicate that heart disease should receive the greatest attention. A careful weighing of the facts, however, will lead us to increase and not decrease the force of our attack on tuberculosis, which kills even more persons than heart disease in this principal productive and reproductive age

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group. This is not to say that heart disease among persons 15 to 44 years of age should be neglected. On the contrary, equal emphasis should be given the problem. However, unlike heart disease, tuberculosis can be effectively controlled, and available methods for that control must be utilized to the utmost and at once. The program of case-finding and follow-up should be expanded rapidly. Only in this way will the morbidity and mortality of tuberculosis be reduced. It is particularly important that the disease be eliminated among the people 15 to 44 years of age. This group constitutes our reservoir of population replenishment and is the source of our most vigorous labor supply. The continuation of a nation's vitality depends upon the health of its people. We must put an end to the costly neglect of known control methods and take up positively the offensive against a disease that kills the young, the hopeful, and the strong.

### TUBERCULOSIS CONTROL IN DENMARK<sup>1</sup>

By JOHANNES HOLM, *Chief Tuberculosis Division, State Serum Institute of Copenhagen, Denmark; Advisory Consultant, Tuberculosis Control Division, United States Public Health Service*

Prior to the Second World War, Denmark was the country with the lowest tuberculosis mortality—3.4 per 10,000 population. As to its relative position after the war, nothing definite is known. There is, however, little reason to think that Denmark has not maintained this position. In contrast to nearly all other European countries, Denmark has had no increase in the incidence of tuberculosis during the war. In Denmark the tuberculosis mortality has remained practically unchanged from 1940 to 1945.

At the beginning of this century, when active combat against tuberculosis began, the tuberculosis mortality in Denmark was the same as in most other countries. It is relevant, therefore, to inquire into Denmark's success in combating the disease.

It is generally recognized that social conditions play an important role in the spread or retrogression of tuberculosis. There can be little doubt that Denmark's good social conditions have been an important factor in the retrogression of tuberculosis. A fairly good knowledge, therefore, of the social conditions in Denmark is required for an understanding of the decrease in the incidence of tuberculosis and of the organization of the fight against the disease in that country.

During the last half century a considerable social development has taken place in Denmark. The country cannot be designated as rich; but economic development has brought about such a change in the distribution of social goods, in favor of the entire population, that an

<sup>1</sup> From the Tuberculosis Control Division.

ideal state has been approached where few have too much and fewer not enough.

This social and economic development has been accompanied by a rise in the living standard for the entire population and, accordingly, improved everyday hygiene. Such conditions have been real forces in combating tuberculosis. It should be pointed out in addition that Denmark is an agricultural country, wherein the diet of the population in general is adequate. With the exception of a brief period during the first world war, there has been no nutritional crisis. Neither has there been such a crisis after the Second World War.

During the past 15 years public social care in Denmark has been elaborated to such an extent that it provides for every old person, for everybody who has become incapable of work from illness or invalidity, and for the unemployed. It should be emphasized that since 1933 every person over 14 years of age has been obliged by law to become a member of a sick benefit club, by means of which free medical advice, free hospitalization and, in part, free medicine are obtained.

#### HISTORY OF THE CONTROL OF TUBERCULOSIS IN DENMARK

Active control of tuberculosis began in Denmark in the first years of this century. As early as 1905 Denmark adopted its first tuberculosis law, which made it compulsory for every physician to report by a special certificate every instance of pulmonary tuberculosis which he diagnosed or had contact with, and also every instance of death of a tuberculous patient. Thus, since 1905, fairly reliable statistics have been available for tuberculosis mortality and morbidity. Figures 1 and 2, illustrate the decrease in tuberculosis mortality until 1944. On the whole the mortality decreased gradually, except for a temporary rise during the first world war.

When the active combat against tuberculosis was initiated, stress was laid on the primary task of obtaining necessary accommodations for the isolation and treatment of tuberculous patients. When this was accomplished, tuberculosis dispensary work was undertaken. The necessary number of beds in hospitals and sanatoria was obtained in part through private philanthropy, through the work of the Danish National Association for the Combating of Tuberculosis, and, to a large extent, through public grants.

Table 1 shows these developments.

From table 1 it will be seen that the required number of beds for the treatment of tuberculous patients was attained in the early twenties, and that Denmark now may be said to be extraordinarily well supplied with beds for tuberculous patients. There is more than 1 tuberculosis bed per 1,000 inhabitants. Because tuberculosis morbidity and mortality are both rather low, this means that in Denmark there are beds enough for the isolation of all patients with

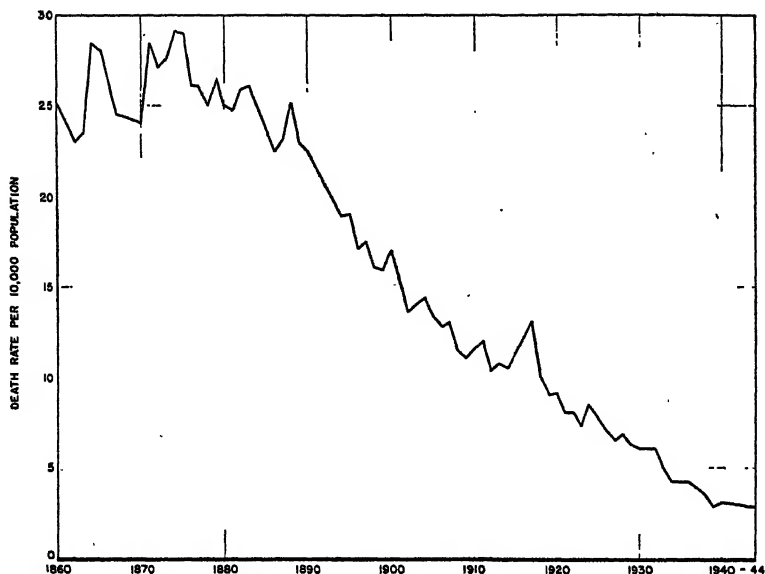


FIGURE 1.—Pulmonary tuberculosis death rate per 10,000 population, Denmark, 1860-1944.

pulmonary tuberculosis in the last, highly infectious stage and even ample accommodations for the treatment of newly diagnosed cases. The adequacy of beds, and the fact that treatment in tuberculosis institutions is free of charge to anybody who is not really well-to-do, played a great role in the favorable outcome of the attack against tuberculosis.

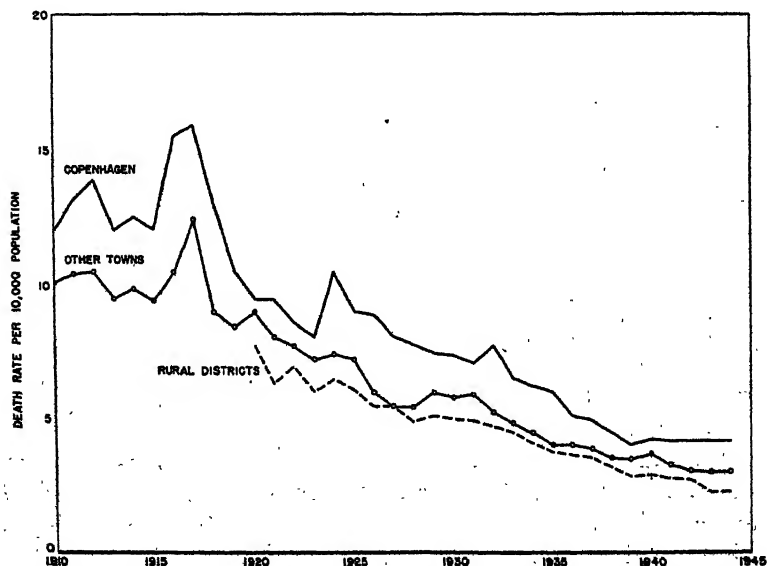


FIGURE 2.—Pulmonary tuberculosis death rate per 10,000 population, areas of Denmark, 1910-44.

TABLE 1.—*Number of beds for tuberculous patients in Denmark for selected years since 1900*

Year	Number of beds for tuberculosis	Tuberculosis beds		
		Per 10,000 inhabitants	Per newly reported cases of pulmonary tuberculosis	Per annual death from pulmonary tuberculosis
1900.....	273	1.1		
1906.....	1,319	5		
1912.....	2,565	9.3		
1920.....	3,064	9.9	0.6	1.3
1928.....	3,607	10.1	.9	1.8
1936.....	4,013	10.8	1.2	2.8
1943.....	4,318	10.9	1.3	3.9

As early as 1908 a few tuberculosis dispensaries were instituted in Denmark. Not until the late twenties, however, did the erection of modern tuberculosis dispensaries really gather headway; and not until 1944 was this development completed. Since 1944, however, the entire country has been served by tuberculosis dispensaries.

In Denmark every county has its own independent institution for the control of tuberculosis. In most instances the center of this organization is a large central tuberculosis dispensary with various branches situated in the larger towns of the county. The chief of such a central tuberculosis dispensary is always a specialist, who, as a rule, has charge of the treatment of the tuberculous patients in the county, because he is the chief physician of the tuberculosis hospital of the county. It has proved to be of great advantage to have the same chief for the tuberculosis dispensary and tuberculosis hospital, so that patients are continuously in the charge of the same physician.

The tuberculosis dispensary is considered, within its functional region, the center of tuberculosis control. This region is most often a county with 100,000 to 200,000 inhabitants.

The known cases of tuberculosis, especially the particularly infectious, are under the observation of the tuberculosis dispensary, partly through frequent examinations of the patients in the dispensary and partly by visits of nurses to homes. The patients are given instruction to prevent the spread of infection. The tuberculosis dispensary provides the patient with a glass for sputum, sometimes bedclothing and laundry service. Occasionally, if required, the dispensary procures better dwellings for the patients. Indeed, all the social aid given the tuberculous patients is distributed through the tuberculosis dispensary and it is very important that the dispensary come in contact in this way with all tuberculous patients. At the same time, the dispensaries insist that their directions for the prevention of the spread of tuberculosis be followed implicitly.

When new cases of tuberculosis are reported the dispensary carries out a thorough examination of the family and close contacts. All



other patients are referred to the dispensary by the general practitioner; persons who apply independently to the dispensary for examination are not admitted.

In recent years the tuberculosis dispensaries have gradually extended their diagnostic activities with a broader interpretation of the concept, "tuberculous milieu." Thus it is the general rule now that places of employment where tuberculosis among the workers has been ascertained are examined by the tuberculosis dispensary; and in the last years it has even become customary for many large organizations to have their entire personnel examined for tuberculosis at regular intervals. Finally, quite recently, the tuberculosis dispensaries have begun so-called universal examinations, during which the entire population of a given district—occasionally only a certain age class—is requested to meet for examination.

Even though the individual tuberculosis dispensaries, as mentioned, are functioning as independent units, they still cooperate closely and have considerable mutual contact. This is practicable because Denmark is small enough to enable all the chiefs of the dispensaries to meet at regular, fairly short intervals and to agree on the technique of the examination as well as to estimate the results of control measures.

#### EXAMINATION FOR TUBERCULOSIS

Because the way in which the examination for tuberculosis is carried out is of fundamental significance to the entire work of a tuberculosis dispensary, it is appropriate to review briefly the performance of such an examination in Denmark. Such examination has additional interest because it differs in some essential respects from the manner of examination in other countries.

In Denmark the examination for tuberculosis invariably includes a tuberculin test, roentgenography, and examination of sputum or gastric lavage for the presence of tubercle bacilli.

1. *Tuberculin test.*—For over 10 years it has been the general rule to perform a tuberculin test on every person examined for tuberculosis. This is done, among other reasons, to secure a BCG vaccination if the person is a nonreactor.

Everywhere in Denmark the tuberculin test is carried out with the same technique and with precisely the same tuberculin. Because of this practice, the results obtained for the various districts are directly comparable. The Mantoux test is the principal method, and the tuberculin is distributed once a month as solutions ready for use, from the State Serum Institute to all tuberculosis dispensaries, hospitals, and many practicing physicians. The intracutaneous test is carried out exclusively with purified tuberculin (P. P. D.), and in most cases solutions of two potencies are sufficient, the first test being made with

1 or 3 T. U. while the final dose is always 100 T. U.<sup>2</sup> The reaction is read 3 days after the injection. Redness and infiltration with a diameter of 8 mm. are considered the lower limit for a positive tuberculin reaction. For children under 10 years—particularly very young children—a Moro patch test is frequently employed instead of the first Mantoux test. The tuberculin ointment used for this test is likewise produced and distributed by the State Serum Institute.

2. *Bacteriological examination.*—During the last 15 years, increasing importance has been attached to the systematic examination for tubercle bacilli in every patient suspected of having tuberculosis. This is done to determine with certainty the diagnosis, prognosis, and treatment and to help the tuberculosis dispensaries determine whether the individual patient is infectious. The small size of the country has made it practicable to centralize the bacteriological examination so that cultivation for tubercle bacilli is carried out in only one place for the entire country, namely, the Tuberculosis Division of the State Serum Institute, which is the central tuberculosis laboratory for all of Denmark. This practice permits a far greater certainty in examination. At the same time the work is facilitated for the individual tuberculosis dispensaries, hospitals, and sanatoria. In Denmark, all distances are so short that the transport of the material for examination involves no difficulty and no marked delay of the result.

In Denmark, great importance has always been attached to examination of the sputum, and since 1905 this form of examination, in a number of special diagnostic stations instituted all over the country, has been free of charge for all practicing physicians. In these stations the sputa are examined only microscopically. In recent years, however, the microscopic examination has been combined to a large extent with cultivation from the sputum for tubercle bacilli. When this is done the sputa must be sent to the State Serum Institute. This development is a natural result of the experience that tubercle bacilli are found far more frequently by cultivation than by limiting the examination of the sputum to microscopy, especially when the sputum contains but relatively few tubercle bacilli. Cultivation further offers the guarantee that the acid-fast and alcohol-fast bacilli which are found on microscopy actually are tubercle bacilli and not saprophytes. So in Denmark it has become the general rule that, even when direct microscopy shows tubercle bacilli, cultivation has to be carried out at least once for each patient in order to establish the diagnosis of tubercle bacilli. In table 2 a comparison is made between the outcome of the microscopic examination and cultivation from sputa examined in the State Serum Institute during the period 1943-44.

<sup>2</sup> 1 T. U. (tuberculin unit) is 1/50,000 mg. standard P. P. D. = 1/100 mg. standard Old Tuberculin.

TABLE 2.—*Comparison of results of sputa examinations by microscopy and cultivation of sputa in the State Serum Institute, 1943-44*

Examination of sputum specimen by microscopy	Total	Number of colonies cultivated from sputum					
		5 and under	6-20	21-100	Over 100	Subtotal positive to sputum cultivation	None
Total.....	26, 671	1, 184	685	833	2, 285	1(4, 987)	21, 584
+++ Tubercle bacillus.....	844	5	-----	18	809	(832)	12
++ Tubercle bacillus.....	404	4	3	16	431	(454)	10
+ Tubercle bacillus.....	847	21	39	128	624	(812)	35
(Subtotal positive to microscopy).....	2(2, 155)	(30)	(42)	(162)	(1, 864)	(2, 098)	3(57)
Negative.....	24, 416	1, 164	643	671	421	4(2, 889)	21, 527

<sup>1</sup> 4,987 or 18.8 percent of total examinations were positive by cultivation of sputa.

<sup>2</sup> 2,155 or 8.1 percent of total examinations were positive by microscopy.

<sup>3</sup> 57 examinations were positive to microscopy, but negative to cultivation of sputa.

<sup>4</sup> 2,889 examinations were negative to microscopy but positive to cultivation of sputa, (57.9 percent of total number positive to sputum cultivation).

Gastric lavage has been employed in Denmark since 1930, not only in children, but also in adults. In recent years this method of examination has been adopted increasingly in the tuberculosis dispensaries. It is now the general rule for every patient who on X-ray films of the chest shows roentgenographic changes suggestive of tuberculosis to be subjected to a thorough bacteriological examination. This consists in examination of the sputum (microscopy+cultivation) if the patient produces any expectorate. If the patient does not raise sputum, gastric lavage is performed. Gastric lavage is further employed extensively for control examination in patients who previously discharged tubercle bacilli. In the tuberculosis dispensaries every such patient has to submit to a thorough bacteriological examination at least once a year, and for nonexpectorating patients this means gastric lavage. This bacteriological examination is carried through in every case of former bacilli carriers until the examination has shown no tubercle bacilli for at least 3 years in succession.

Table 3 gives the number of such bacteriological examinations performed in the State Serum Institute in the past 5 years, illustrating the great increase in the employment of cultivation from the sputa and gastric lavage examination.

TABLE 3.—*Specimens cultivated for tubercle bacilli in the State Serum Institute, 1941-45*

Specimen received	1941	1942	1943	1944	1945
Total.....	20, 721	26, 267	38, 871	45, 306	51, 126
Gastric lavage.....	9, 542	12, 307	16, 821	19, 620	20, 898
Sputum.....	4, 905	6, 259	12, 071	15, 710	20, 289
Pleural effusion.....	1, 327	1, 578	1, 769	1, 985	2, 645
Spinal fluid.....	359	644	681	709	663
Urine.....	2, 508	3, 407	4, 551	4, 649	4, 606
Fus. tissue, etc.....	2, 080	2, 172	3, 128	2, 633	2, 545

3. *Roentgenological examination.*—Every tuberculosis dispensary has X-ray equipment. In Denmark no examination for tuberculosis is considered adequate unless the lungs are examined roentgenologically. In most dispensaries fluoroscopy is employed for continuous control, and it is utilized at every examination in the tuberculosis dispensary. In recent years several tuberculosis dispensaries have been equipped with a small film X-ray unit, and a few dispensaries have also purchased mobile small film units for examination outside the dispensary. For final diagnosis a large celluloid film is always taken of every person with suspect findings on small film or by fluoroscopy.

In order to obtain comparable results from the various tuberculosis dispensaries, all the tuberculosis dispensaries agreed some years ago to employ a uniform method for registering the results of examinations. These results are recorded after the following code.

#### CODE FOR CLASSIFICATION OF PULMONARY TUBERCULOSIS <sup>6</sup>

##### First digit (bacillary aspects)

1. Gastric lavage cultures: —T. B.
2. Sputum, cultures: —T. B.
3. Sputum, microscopy: —T. B. No further examination.
4. No expectoration. Gastric lavage not performed.
5. Gastric lavage, cultures: +T. B.
6. Sputum, cultures: +T. B.
7. Sputum, microscopy: +T. B. (a few bacilli).
8. Sputum, microscopy: ++T. B. (several bacilli).
9. Sputum, microscopy: +++T. B. (numerous bacilli).

##### Second digit (X-ray aspects)

0. No demonstrable processes.
1. Processes unilateral; no suggestion of cavitation.
2. Processes bilateral; no suggestion of cavitation.
3. Processes unilateral; suspicion of cavitation.
4. Processes unilateral; distinct cavitation.
5. Processes bilateral; suspicion of cavitation on one side.
6. Processes bilateral; distinct cavitation on one side.
7. Processes bilateral; suspicion of cavitation on both sides.
8. Processes bilateral; distinct cavitation on one side, cavitation suspected on the other side.
9. Processes bilateral; distinct cavitation on both sides.

<sup>6</sup>This code was developed in Copenhagen in 1939 by Dr. Herman E. Hilleboe, Dr. Knud Winge, Dr. Sigrid Holm, and Dr. Johannes Holm.

## CODE FOR CLASSIFICATION OF PULMONARY TUBERCULOSIS—CON.

## Third digit (X-ray aspects)

0. No demonstrable infiltration.
1.  $<\frac{1}{2}$  lung involved; infiltration scattered.
2.  $<\frac{1}{2}$  lung involved; infiltration scattered and dense.
3.  $<\frac{1}{2}$  lung involved; infiltration dense.
4.  $\frac{1}{2}$ –1 lung involved; infiltration scattered.
5.  $\frac{1}{2}$ –1 lung involved; infiltration scattered and dense.
6.  $\frac{1}{2}$ –1 lung involved; infiltration dense.
7.  $>1$  lung involved; infiltration scattered.
8.  $>1$  lung involved; infiltration scattered and dense.
9.  $>1$  lung involved; infiltration dense.

By means of the above code the more important results in a given case can be recorded by means of a figure which includes only 3 digits, the first signifying the result of the bacteriological examinations, and the last two indicating the outcome of the roentgenological examination.

The same classification of results of examination is employed in the official statistics of Denmark, and the information required for codification of the results is requested in every certificate that records a new case of tuberculosis. The figures recorded in table 4 are taken from the official statistics and they present a comprehensive impression of the stage at which pulmonary tuberculosis is diagnosed in Denmark. It is of particular interest to note that over one-half of the cases have been diagnosed when the disease processes were localized in one lung alone. It can be observed that unquestionable cavitation was encountered only in about one-fifth of the cases at the time when the lesion was first recognized.

TABLE 4.—*Percent of newly reported cases of pulmonary tuberculosis according to coded classifications showing selected data, in Denmark, 1941–44*

Selected data	Percent of newly reported cases			
	1941	1942	1943	1944
Tubercle bacilli in sputum or gastric lavage.....	67.0	69.5	76.0	79.6
Definite cavity formation.....	23.5	19.7	18.2	20.6
Unilateral lung processes.....	51.0	56.1	55.1	52.1
Bilateral lung processes.....	40.3	35.1	32.1	32.7

## EPIDEMIOLOGICAL ASPECTS OF TUBERCULOSIS IN DENMARK

As both tuberculosis mortality and morbidity have been relatively low in Denmark over a number of years, the epidemiological aspects of tuberculosis in Denmark today have interest and significance.

In Denmark the occurrence of tuberculosis among cattle has had great influence on the prevalence of tuberculosis in man. A discussion

of this aspect of the problem is a natural prelude to subsequent epidemiological considerations.

#### INFLUENCE OF TUBERCULOSIS AMONG CATTLE ON THE INCIDENCE OF TUBERCULOSIS IN MAN

Although the combat against tuberculosis among cattle in Denmark had its beginning in the first years of this century, little real progress was made until the middle thirties. Around 1930 it was still highly prevalent, but the energetic fight against this disease, waged during the past 10 years (after the Bang method) has now greatly reduced its incidence. At present, the islands are practically free from tuberculosis among cattle, and in north and east Jutland the disease is only slight in extent. The incidence in south and west Jutland, however, is still high. In these parts of the country a very active fight against the disease has been inaugurated, and it will be but a few years before Denmark is free of bovine tuberculosis.

Tuberculosis among cattle has exerted its influence on the incidence of tuberculosis in man in two ways: the transmission of the infection from cattle to man has taken place indirectly through the milk, and directly as a result of contact with the tuberculous animals. These modes of infection were thoroughly investigated.<sup>3</sup> It was learned that even though the transmission of tubercle bacilli through milk results in an infection which manifests itself by a positive tuberculin reaction in a great number of persons, it is only in exceptional cases, particularly in infants, that transmission through milk produces tuberculous lesions. On the other hand, the infection resulting from direct contact with tuberculous cattle has produced genuine tuberculous lesions in a high percentage of cases. It has been practicable to ascertain this fact from the systematic typing performed in every cultivation for tubercle bacilli. Both in pulmonary and extrapulmonary tuberculosis, the bovine type of tubercle bacillus is found almost exclusively in the rural population, and here it can be traced to direct transmission of the infection from the animals. In those parts of the country where tuberculosis among cattle has high prevalence, nearly half of the cases of pulmonary tuberculosis in farmers have been shown to be produced by the bovine type of tubercle bacillus.

TABLE 5.—*Percent of herds reacting to tuberculin, Jutland, the Islands and Denmark, 1937-45*

Year	Jutland	Islands	Entire Denmark	Year	Jutland	Islands	Entire Denmark
1937.....	80.3	63.9	73.5	1942.....	41.1	6.4	28.8
1938.....	72.9	42.9	62.0	1943.....	28.7	3.4	19.7
1939.....	67.7	31.6	54.6	1944.....	20.6	0.9	13.7
1940.....	60.6	19.2	38.3	1945.....	13.7	0.1	8.9
1941.....	53.2	11.5	28.8				

<sup>3</sup> Madsen, Th.; Holm, Johannes; Jensen, K. A.; *Epidemiology of Tuberculosis in Denmark*, Copenhagen, 1942. Amplification for much of the material in this article is presented in this work.

As tuberculosis among cattle decreases in a given district, the incidence of bovine tuberculosis in man also decreases. When tuberculosis among cattle has been eradicated for some years, the bovine type will no longer be demonstrable as the cause of tuberculosis in man. This is surprising because *a priori*, it would be expected that persons with bovine pulmonary tuberculosis would spread the infection with the bovine type of the tubercle bacillus. That this is not the case shows, as do other investigations, that the type characters of the tubercle bacilli are not constant. After staying in the human organism for some time, the bovine type of the tubercle bacilli will change in character in such a way as to be diagnosed as the human type.

There can be no doubt that the eradication of tuberculosis among cattle removes the cause of numerous cases of tuberculosis in farmers. Most likely, tuberculosis among cattle has been responsible for the fact that in some parts of Denmark tuberculosis morbidity and mortality were greater in the rural districts than in the towns.

As cultures for the growth of tubercle bacilli are made in the State Serum Institute from practically every patient with tuberculosis, and as the demonstrated tubercle bacilli invariably are typed at the same time, it has been possible in this institute to keep a card index of the demonstration of tubercle bacilli for practically all the tuberculous patients in Denmark. The following tabulations are compiled on the basis of this index.

From table 6, which is based upon all typings made in the State Serum Institute in Copenhagen since 1932, it is evident that tubercle bacilli of the bovine type are found far more frequently in extrapulmonary tuberculosis than in pulmonary. In particular, tuberculosis of the cervical lymph glands is very often brought about by the bovine type. As a matter of fact, this lesion, which previously was very common among the young in the rural population of Denmark, has become a rare affection in recent years.

TABLE 6.—*Relative frequency of bovine type bacillus in patients with pulmonary and extrapulmonary forms of tuberculosis*

Form of tuberculosis	Type of tubercle bacillus		
	Total human and bovine	Bovine	
		Number	Percent of total
Pulmonary.....	18, 231	756	4.1
Sputum.....	7, 378	403	5.5
Gastric lavage.....	9, 611	233	2.9
Pleural effusion.....	1, 242	70	5.6
Extrapulmonary.....	4, 186	829	19.8
Urine.....	1, 207	146	13.2
Spinal fluid.....	845	162	19.2
Bone-joints.....	710	122	19.2
Cervical lymph glands.....	585	200	34.2
Other lymph glands.....	880	190	22.4

From table 7, which, in contrast to table 6, is based upon cultivations only from tuberculous patients who were known to be alive on January 1, 1944, it will be noticed that as many as 3½ percent of all the patients with pulmonary tuberculosis still present tubercle bacilli of the bovine type, and this percentage is fairly constant for all age classes. In cases of extrapulmonary tuberculosis children, and young people particularly, show the presence of tubercle bacilli of the bovine type.

That tuberculosis among cattle has had a great influence on the percentage of positive tuberculin reactions in the Danish population is illustrated by the extensive examinations for tuberculosis carried on in recent years by the State Serum Institute.<sup>4</sup> The percentage of positive tuberculin reactions varied greatly in the different parts of the country, depending on the extent of tuberculosis among the cattle.

TABLE 7.—*Relative frequencies of bovine type bacillus in patients with pulmonary and extrapulmonary forms of tuberculosis by age groups; data compiled for patients living on January 1, 1944*

Age groups	Pulmonary tuberculosis			Extrapulmonary tuberculosis		
	Total human and bovine	Bovine		Total human and bovine	Bovine	
		Number	Percent		Number	Percent
Total.....	11, 072	384	3.5	1, 454	204	14.0
0-4 years.....	473	18	3.8	91	31	34.1
5-9 years.....	476	15	3.2	71	20	28.2
10-14 years.....	519	7	1.3	43	7	16.3
15-19 years.....	1, 457	51	3.5	130	23	17.7
20-24 years.....	2, 282	68	3.0	190	24	12.6
25-29 years.....	1, 787	67	3.7	177	29	16.4
30-34 years.....	1, 267	42	3.3	130	18	13.8
35-39 years.....	860	30	3.5	115	13	11.3
40-44 years.....	563	23	4.1	105	10	9.5
45-49 years.....	413	13	3.1	81	7	8.6
50-54 years.....	295	15	5.1	73	5	6.8
55-59 years.....	242	12	5.0	63	9	14.3
60-64 years.....	171	9	5.3	61	5	8.2
65-69 years.....	120	5	4.1	48	2	4.7
70 and over.....	139	9	6.5	70	1	1.4
Unknown.....	8			11		

From figures 3 and 4 it will be seen that in those parts of the country where tuberculosis among cattle was eradicated long ago (Bornholm) or where it has been merely of slight extent for several years (Zeeland), the reaction percentage among children and young people is low, whereas it is very high in the parts where tuberculosis prevails among cattle (South Jutland).

When, in a given part of the country, tuberculosis among cattle is eradicated, the reaction percentage for the population falls abruptly, and this decline manifests itself first among the children. From table 8, which shows the tuberculin reaction percent for the youngest children in the schools of Copenhagen, it will be noticed that this percentage has decreased quite considerably during the last 8 years.

<sup>4</sup> See footnote (2).



In Copenhagen, infection with tubercle bacilli through milk has been eliminated since 1936, and there can be little doubt that this explains the marked fall in the reaction percentage.

TABLE 8.—*Percent of boys and girls positive to tuberculin tests during first year in school, Copenhagen 1937-45*

School Year	Percent positive to tuberculin by sex		School Year	Percent positive to tuberculin by sex	
	Boys	Girls		Boys	Girls
1937-38.....	18.1	18.6	1941-42.....	10.4	10.1
1938-39.....	15.0	15.8	1942-43.....	8.2	7.2
1939-40.....	13.0	12.3	1943-44.....	7.6	7.0
1940-41.....	12.3	11.7	1944-45.....	6.9	5.6

A more direct expression of the influence of tuberculosis among cattle on the spread of tuberculous infection in man is obtained by estimating the inversion rate and the reversion rate among the persons examined. By repeated tuberculin tests on previously tuberculin-tested persons the percentage of previously tuberculin-negative persons who become tuberculin-positive within a certain period (inversion rate) can be estimated. These tests also serve as a basis for estimating the percentage of former tuberculin-positives who lose their sensitiveness to tuberculin (reversion rate). Since in Denmark the Mantoux tuberculin test is performed with as high a dosage as 100 T. U., the calculations of the inversion rate and reversion rate are made accordingly. A person reacting negatively to a Mantoux test with 100 T. U. is called an inverter if he later reacts to the same test or a test with a lower dose of tuberculin. A person reacting to a Mantoux test with 100 T. U., or lower dose of tuberculin, is called a reverter if he later reacts negatively to a Mantoux test with the dose 100 T. U.

In the districts recorded in table 9 the incidence of human tuberculosis is about the same, whereas that of tuberculosis among cattle differs greatly. Where tuberculosis among cattle can be excluded, we find a fairly low inversion rate (a few percent annually) and a relatively high reversion rate (3 to 4 percent annually), whereas in districts with tuberculosis prevalent among the cattle there is a considerably higher annual inversion rate (about 10 percent) and a minimal yearly reversion rate (0.2 percent).

TABLE 9.—*"Inversion rate" and "reversion rate" for school children in different areas of Denmark by selected years*

Area	Tuberculosis in cattle	Tuberculin testing of school children	
		Annual inversion rate per 100	Annual reversion rate per 100
Haderslev Town 1935-38.....	(++)	10.2	0.2
Haderslev County 1936-38.....	++	5.9	.2
Nakskov Town 1932-35.....	0	2.3	3.6
Bornholm 1937-40.....	0	2.7	3.6

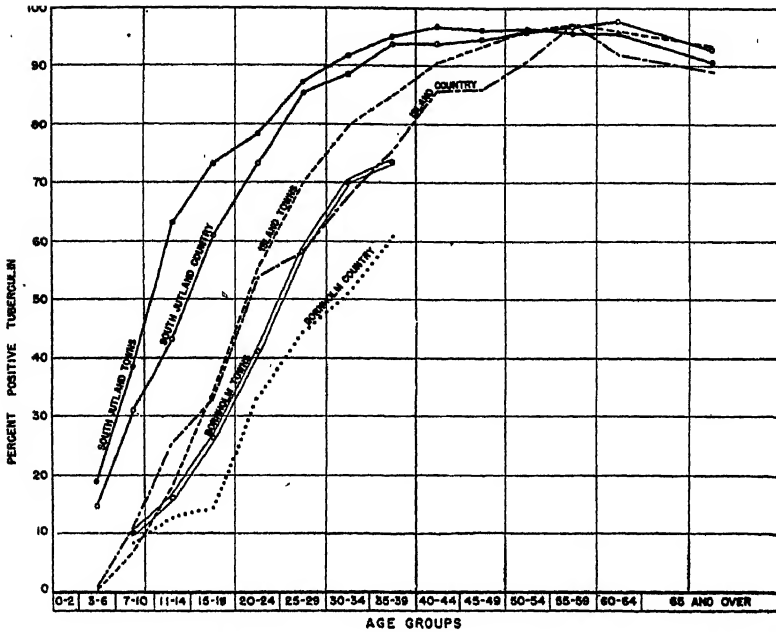


FIGURE 3.—Tuberculin tests performed by the State Serum Institute, by age groups, 1941-44.

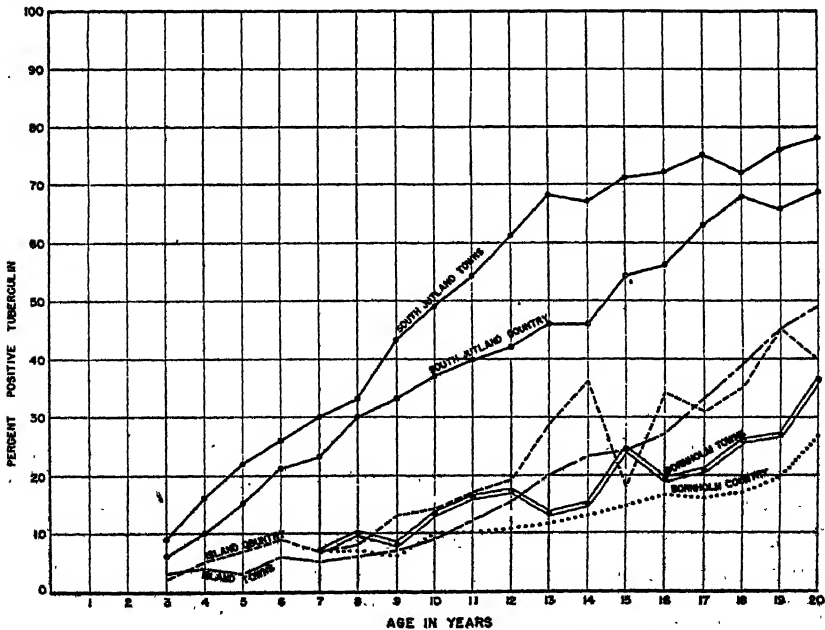


FIGURE 4.—Tuberculin tests performed by the State Serum Institute, by selected ages, 1941-44.

## PRIMARY INFECTIONS IN MAN

The low percentage of tuberculin reactions in the Danish population has brought about the fact that primary infections in adults, especially young adults, have become very frequent. It is the general experience that primary infections are far more dangerous in adults than in children, and that a considerable number of the cases of tuberculosis in the adults are closely related to primary infections. This may perhaps explain why tuberculosis morbidity is greatest for young adults.

A number of investigations have been reported on primary infections. As an example of such investigations, the following, carried out in Copenhagen, is to be mentioned. This study included all recent infections diagnosed in the tuberculosis dispensary of Copenhagen within the period of 1936 to 1941. All the newly infected

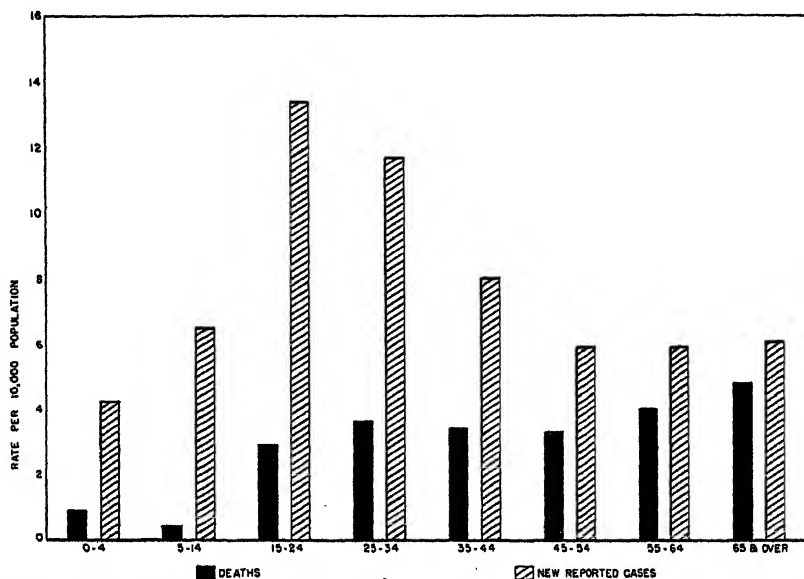


FIGURE 5.—Pulmonary tuberculosis death rate and newly reported case rate per 10,000 population by age groups, Denmark, 1944

patients were examined thoroughly at the time when infection was ascertained, and later they were followed up. The observation lasted several years.

Table 10 shows how often recent infection is associated with X-ray findings in the lungs and with the discharge of tubercle bacilli, and how many of these subjects subsequently have a genuine pulmonary tuberculosis. A shadow on the X-ray film, even if associated with discharge of tubercle bacilli, is not considered enough to give a diagnosis of a case of genuine pulmonary tuberculosis. This diagnosis is made only when subsequent follow up shows a spread of the

disease in the lungs. It will be noticed that relatively more children get demonstrable roentgenographic findings in the lungs and show tubercle bacilli, whereas relatively far more adults develop genuine tuberculosis.

The same investigation includes also some interesting observations on the treatment of the primary infection. It has been found that treatment of the primary infection does not prevent a later propagation of tuberculosis, and hence there is a tendency now to delay treating the primarily infected persons, with X-ray findings in the lungs, in a hospital or sanatorium. Such persons are kept under close observation in the tuberculosis dispensary and no particular treatment is recommended until evidence of propagation of the processes is apparent.

TABLE 10.—*Follow-up study of inverters to tuberculin, Copenhagen, 1936-41 (after Sigrid Holm)*

Inverters	Total	First examination at time of inversion				Subsequent findings after several years follow-up				
		X-ray findings		Tubercle bacilli demonstrated		X-ray findings		Genuine tuberculosis		
		Number	Percent of total	Number	Percent of total	Number	Percent of total	Number	Percent—	
									Of total	Of X-ray findings
Total.....	2,298	437	19.0	176	7.7	492	21.4	81	3.5	16.5
Children 1-6 years..	288	93	32.3	38	13.2	96	33.3	3	1.0	3.1
Children 7-14 years..	732	163	22.3	59	8.1	171	23.4	10	1.4	5.6
Adults, male.....	695	102	14.7	42	6.0	125	18.0	25	5.0	23.0
Adults, female.....	583	79	13.6	37	6.3	100	17.2	33	5.7	33.0

#### SOURCE OF THE TUBERCULOUS INFECTION IN MAN

Tuberculosis has gradually become a fairly infrequent disease in Denmark. Therefore, in those parts of the country where tuberculosis among cattle has been eradicated there is opportunity to investigate the source of infection in the cases of persons who acquire tuberculosis. Thus it has been found that the already recognized case of infectious pulmonary tuberculosis plays no decisive role in spreading the disease. When the physician reports a newly diagnosed case of tuberculosis, he must state the occasion on which the diagnosis was made. This affords some valuable information—as is evident from table 11 which was compiled from the official statistics.

From table 11 it will be noticed that in 1944 only about one-tenth of the new cases were diagnosed on examination of contacts and household (milieu) of the already recognized cases of tuberculosis. In 1944 nearly three-fourths of the new cases were diagnosed because of symptoms in the patients themselves. This might to some degree be a

result of the sick benefit club system in Denmark, with free medical advice, since most persons consult their physician for even relatively slight symptoms. At the same time, it must be emphasized that general practitioners take an active part in the control and eradication of tuberculosis and refer their patients to the tuberculosis dispensaries

TABLE 11.—*Percent of newly reported cases of pulmonary tuberculosis, Denmark, 1941-44, by reason for examination*

Reasons newly reported cases were diagnosed for tuberculosis	1941	1942	1943	1944
Total.....	100	100	100	100
Symptoms.....	68.7	65.9	70.5	74.0
Examination of milieu.....	10.7	11.8	10.5	10.3
Group examinations.....	7.5	9.0	6.7	8.1
Other and unknown.....	13.1	13.3	12.3	10.6

for examination, even when the symptoms are slight and not characteristic.

It has been realized increasingly that unrecognized cases of pulmonary tuberculosis constitute the most serious sources of infection, and in recent years, therefore, great efforts have been made to diagnose as many cases in this category as possible. This program has been included in the more extensive examinations performed by the tuberculosis dispensaries in recent years, and lately the tuberculosis dispensaries have begun to carry out really universal examinations that cover the entire population of a given district.

In 1941 the State purchased a so-called X-ray car, equipped especially for mass examinations for tuberculosis, and this car is employed among other things to show the practicability and significance of universal examinations of the population. After such examinations performed in 1941-43,<sup>5</sup> in various districts of the country, covering about 50,000 persons, it was ascertained that previously unrecognized infectious pulmonary tuberculosis could be demonstrated in about one in every 500 individuals examined.

#### BCG VACCINATION

Owing to the epidemiological aspect of tuberculosis in Denmark—with the low percentage of positive tuberculin reactions among the young adults, together with the frequent and dangerous primary infections—BCG vaccination has been employed rather extensively in recent years. As long as tuberculosis among cattle prevailed in Denmark, the tubercle bacilli present in milk effectuated a vaccination against tuberculosis in the inhabitants, even though this was not intended. Now, however, after tuberculosis among cattle has been practically eradicated in great parts of Denmark, vaccination pre-

<sup>5</sup> Holm, Johannes, and Holm, Mogens: National examinations for tuberculosis *Acta tuberc. Scandinav.* 19-71 (1945).

viously obtained from milk has been replaced by the more rational BCG vaccination.

As mentioned before, every examination for tuberculosis performed in a tuberculosis dispensary implies a tuberculin test, and the general principle is now to advise all tuberculin-negative individuals over 7 to 8 years to submit to BCG vaccination. Not only tuberculin-negatives living in a tuberculous milieu and in other groups particularly exposed to risk of infection are vaccinated, but also tuberculin-negatives in the ordinary population which is not particularly exposed.

After 15 years' employment of BCG vaccination in Denmark, general experience has shown that this form of vaccination is quite safe and accompanied by relatively few complications when it is carried out properly. Indeed, BCG vaccination offers a considerable protection not only against the morbid phenomena that accompany the primary infection, but also against the development of genuine tuberculosis.

In the universal examinations now going on, for instance, in Copenhagen, a city of 1 million inhabitants, where during this year the entire population between 15 and 35 years will be examined, BCG vaccination is recommended to all tuberculin negatives. In recent years systematic vaccination of all school children in the upper classes has been initiated. Generally, BCG vaccination has been appreciated greatly by the population, and only a few percent of the tuberculin-negatives have refused to submit to it.

If the present program against tuberculosis, which now is active in Denmark, is allowed to continue under peaceful conditions, there is every reason to believe that within a relatively few years tuberculosis will become a rare disease in Denmark.

## TUBERCULOSIS MORTALITY IN MAJOR CITIES: UNITED STATES, 1944<sup>1</sup>

By ELIZABETH H. PITNEY, *Social Science Analyst, United States Public Health Service*, and RICHARD V. KASIUS, *Assistant Statistician, United States Public Health Service*

More than one-third of the deaths from tuberculosis in the United States are found among residents of the 92 largest cities. A knowledge of the distribution of these deaths is one of the working tools required for the direction and evaluation of effective control programs. Data on tuberculosis mortality in large cities for past years have been presented by Liveright (1), the New York Tuberculosis and Health

<sup>1</sup> From the National Office of Vital Statistics and the Tuberculosis Control Division.

(NOTE: This paper is, in part, a summary of a longer study with the same title and by the same authors, published as a Vital Statistics-Special Report (*in press*). Detailed data are given on tuberculosis mortality in the 92 large cities, by age, race, and sex, for 1944.)

Association (2), the National Tuberculosis Association (3), and Kasius and Pitney (4). The purpose of this paper is twofold: first, to present data for 1944 on the mortality from tuberculosis among residents of the 92 cities of the United States having a population of 100,000 or more in 1940; and secondly, to present information for these cities on the distribution of deaths from respiratory tuberculosis among the various types of institutions.

Because population estimates necessary for computing death rates are not available, further use is made in this paper of the tuberculosis death ratio, or proportionate mortality. This measure, relating the number of deaths from tuberculosis to the number of deaths from all causes, is an index of the relative importance of tuberculosis as a cause of death. Its interpretation and limitations have been discussed in an earlier paper (4).

#### TUBERCULOSIS MORTALITY BY AGE, RACE, AND SEX

Tuberculosis is found to account for 4.5 percent of all deaths occurring among residents of the 92 major cities of the United States in 1944. For whites and nonwhites, respectively, the tuberculosis death ratios were 3.6 and 11.5 per 100 deaths from all causes.

The variation with age, race, and sex in the mortality from tuberculosis in the large cities is illustrated in table 1, in which tuberculosis death ratios by age, race, and sex are shown for the combined populations of the 92 cities in 1944.

TABLE 1.—*Death ratios per 100 deaths from all causes for tuberculosis (all forms) by sex, age and race, for 92 cities of over 100,000 population: United States, 1944*

[By place of residence]

Race	Total	Male					Female				
		All ages	Under 15	15-44	45-64	65 and over	All ages	Under 15	15-44	45-64	65 and over
All races.....	4.5	5.3	2.0	16.5	6.1	1.6	3.5	2.8	17.0	2.1	0.6
White <sup>1</sup> .....	3.6	4.4	1.4	13.5	5.7	1.5	2.5	2.0	13.7	1.9	.6
Nonwhite <sup>2</sup> .....	11.5	12.5	5.4	26.3	9.7	2.6	10.5	6.7	25.2	3.3	1.1

<sup>1</sup> For cities having small nonwhite populations (less than 20,000 or less than 10 percent of the total population according to the 1940 census) the data for all races are used to approximate those for the white population.

<sup>2</sup> Based on data for only those cities in which the nonwhite population constitutes at least 10 percent of the total population or numbers 20,000 or more according to the 1940 census.

The tuberculosis death ratios for males of all races increase from 2.0 in the age group under 15 years to 16.5 in the age group 15 to 44, and then decline to 6.1 and 1.6 in the age groups 45 to 64 and 65 and over, respectively. The death ratios for females follow the same pattern, modified somewhat by a greater concentration of tuberculosis deaths at the younger ages. In each age group, tuberculosis causes a far larger proportion of the total deaths among nonwhite residents

of the major cities than it does among white. For nonwhites 15 to 44 years of age, tuberculosis assumes such importance that the elimination of this single cause of death would effect a reduction of 25 percent in the total mortality of nonwhite males and females of this age.

A review of the series of tuberculosis death ratios, specific for age, race, and sex for the combined populations of the 92 cities (fig. 1) for the three periods 1939-41, 1942-43, and 1944, leads to the general conclusion that the proportionate mortalities for males, both white and nonwhite, have remained rather stable, while those for females in both race groups have tended to decline. The total death ratio for

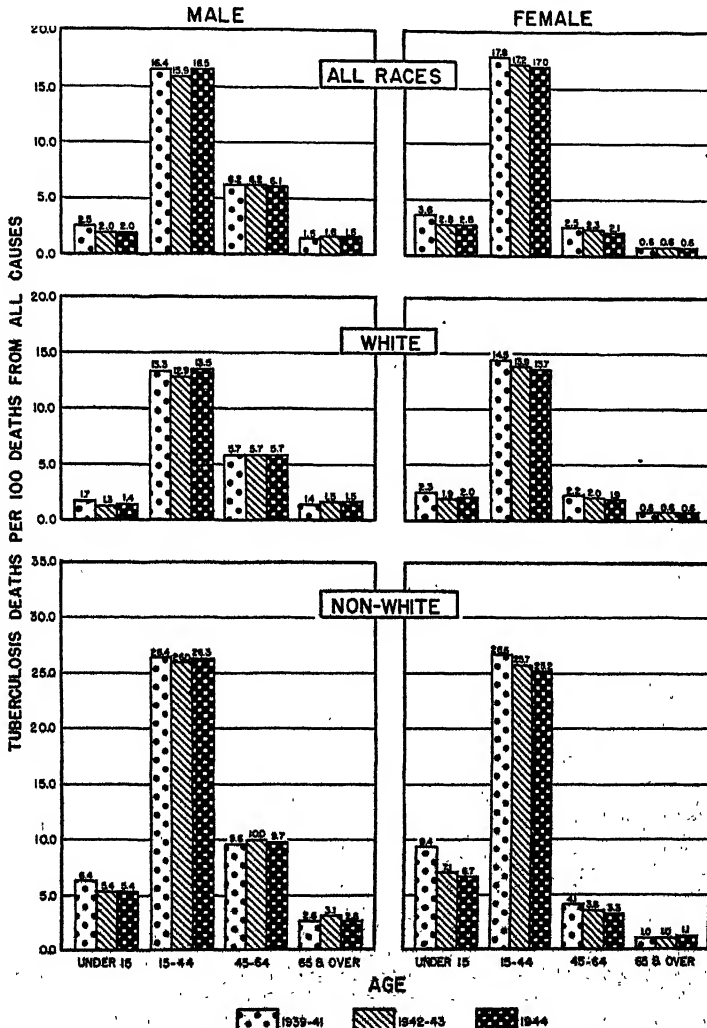


FIGURE 1.—Death ratios for tuberculosis (all forms) by age, race, and sex for 92 cities of over 100,000 population: United States, 1939-41, 1942-43, and 1944.



the 92 cities has declined from 5.0 in 1939-41 to 4.6 in 1942-43 and to 4.5 in 1944.

The tuberculosis death ratios for all races, whites,<sup>2</sup> and nonwhites, in the individual cities in 1944,<sup>3</sup> are given in tables 2 to 4 with the corresponding ratios for 1942-43 and for the 3-year period 1942-44. In each table the cities are listed in the rank order of their death ratios for 1942-44. The widely differing role that tuberculosis plays in the

TABLE 2.—Death ratios per 100 deaths from all causes for tuberculosis (all forms) for 92 cities of over 100,000 population: United States, 1944, 1942-43, and 1942-44 (all races)

[Cities are ranked according to the death ratios for 1942-44, by place of residence]

Rank	City	Death ratio 1942-44	Death ratio 1944	Death ratio 1942-43	Rank	City	Death ratio 1942-44	Death ratio 1944	Death ratio 1942-43
1	Salt Lake City, Utah...	1.3	1.2	1.4	46	Fort Worth, Tex.....	3.8	3.2	4.1
2	Grand Rapids, Mich.....	1.7	1.5	1.8	46	Milwaukee, Wis.....	3.8	3.9	3.8
3	Spokane, Wash.....	1.7	1.7	1.7	46	San Diego, Calif.....	3.8	4.0	3.7
4	Des Moines, Iowa.....	1.8	2.1	1.7	50	Denver, Colo.....	3.9	3.9	3.8
4	Long Beach, Calif.....	1.8	1.9	1.8	51	Cambridge, Mass.....	4.0	4.1	3.9
6	Duluth, Minn.....	1.9	1.7	2.0	51	Columbus, Ohio.....	4.0	3.9	4.0
7	Wichita, Kans.....	2.1	1.4	2.5	53	Oamden, N. J.....	4.1	4.0	4.2
8	Minneapolis, Minn.....	2.2	2.5	2.1	53	Indianapolis, Ind.....	4.1	4.1	4.2
8	Springfield, Mass.....	2.2	1.5	2.6	55	Pittsburgh, Pa.....	4.3	4.2	4.3
10	Syracuse, N. Y.....	2.3	2.1	2.4	55	St. Louis, Mo.....	4.3	3.9	4.4
10	Utica, N. Y.....	2.3	2.5	2.1	57	Knoxville, Tenn.....	4.5	4.2	4.6
12	Somerville, Mass.....	2.4	2.1	2.6	57	San Francisco, Calif.....	4.5	4.8	4.4
13	Portland, Oreg.....	2.5	2.5	2.4	59	New York, N. Y.....	4.6	4.6	4.6
14	Flint, Mich.....	2.6	2.1	2.8	59	Norfolk, Va.....	4.6	3.2	5.2
15	Lowell, Mass.....	2.7	2.7	2.7	61	Los Angeles, Calif.....	4.7	4.5	4.7
16	Elizabeth, N. J.....	2.8	2.9	2.8	61	Toledo, Ohio.....	4.7	4.4	4.9
16	Omaha, Nebr.....	2.8	3.4	2.5	61	Tulsa, Okla.....	4.7	4.9	4.6
18	St. Paul, Minn.....	2.8	2.6	3.0	64	Buffalo, N. Y.....	4.8	5.2	4.5
19	Peoria, Ill.....	2.9	3.7	2.5	64	Dallas, Tex.....	4.8	4.2	5.1
20	Canton, Ohio.....	3.0	2.4	3.3	64	Philadelphia, Pa.....	4.8	4.9	4.7
20	Fort Wayne, Ind.....	3.0	2.2	3.4	67	Chicago, Ill.....	4.9	4.8	5.0
20	Rochester, N. Y.....	3.0	3.4	2.8	67	Dayton, Ohio.....	4.9	4.7	5.0
20	Tacoma, Wash.....	3.0	2.9	3.1	67	Louisville, Ky.....	4.9	5.4	4.6
24	Akron, Ohio.....	3.1	2.7	3.4	70	Boston, Mass.....	5.0	4.9	5.0
24	New Haven, Conn.....	3.1	3.4	2.9	70	Tampa, Fla.....	5.0	5.0	4.9
24	Worcester, Mass.....	3.1	3.6	2.9	70	Trenton, N. J.....	5.0	4.9	5.5
27	Charlotte, N. C.....	3.2	2.7	3.4	73	Cleveland, Ohio.....	5.1	4.9	5.2
27	Erie, Pa.....	3.2	3.3	3.1	74	Gary, Ind.....	5.2	3.5	6.0
27	New Bedford, Mass.....	3.2	3.3	3.2	74	Jersey City, N. J.....	5.2	5.6	5.0
27	South Bend, Ind.....	3.2	3.8	2.8	76	Nashville, Tenn.....	5.4	4.7	5.7
31	Kansas City, Kans.....	3.3	2.9	3.6	76	Newark, N. J.....	5.4	5.1	5.5
31	Oakland, Calif.....	3.3	3.0	3.5	78	Cincinnati, Ohio.....	5.5	5.7	5.3
31	Wilmington, Del.....	3.3	3.1	3.3	78	Richmond, Va.....	5.5	5.5	5.6
34	Albany, N. Y.....	3.4	3.6	3.4	80	Miami, Fla.....	5.6	5.7	5.6
34	Faterson, N. J.....	3.4	2.6	3.8	81	New Orleans, La.....	5.7	5.3	5.9
36	Hartford, Conn.....	3.5	3.7	3.3	82	Houston, Tex.....	5.8	5.7	5.9
36	Oklahoma City, Okla.....	3.5	3.2	3.7	83	Atlanta, Ga.....	5.9	5.1	6.3
36	Providence, R. I.....	3.5	3.6	3.4	83	Detroit, Mich.....	5.9	6.0	5.9
36	Reading, Pa.....	3.5	3.5	3.4	85	Jacksonville, Fla.....	6.0	5.4	6.2
36	Sarankon, Pa.....	3.5	3.0	3.8	86	Baltimore, Md.....	6.3	6.3	6.3
36	Yonkers, N. Y.....	3.5	2.6	4.0	86	Memphis, Tenn.....	6.3	5.9	6.5
42	Bridgeport, Conn.....	3.6	3.9	3.4	88	Washington, D. C.....	6.4	6.7	6.8
42	Kansas City, Mo.....	3.6	3.4	3.7	89	Birmingham, Ala.....	6.5	6.7	6.4
42	Seattle, Wash.....	3.6	3.3	3.5	90	Sacramento, Calif.....	6.8	6.2	7.2
45	Youngstown, Ohio.....	3.7	2.2	4.5	91	Chattanooga, Tenn.....	8.0	7.1	8.4
46	Fall River, Mass.....	3.8	4.0	3.7	92	San Antonio, Tex.....	9.5	8.7	8.9

<sup>2</sup> Deaths have been tabulated by race for only the 40 cities in which the nonwhite population in 1940 numbered at least 20,000 or constituted 10 percent of the total population. In the other 52 cities, where nonwhites constitute a small proportion of the total population, the death ratios for all races are the same, for all practical purposes, as those for whites, and are used here to approximate them.

<sup>3</sup> No attempt has been made to rank the cities in accordance with their ratios for 1944 for the reason that, based on a single year's experience, the ratios are computed from a relatively small number of deaths. A chance variation alone could account for apparently large changes in rank order. The number of tuberculosis deaths on which the ratios for 1944 are based are given in table 3.

TABLE 3.—*Death ratios per 100 deaths from all causes for tuberculosis (all forms) for 92 cities of over 100,000 population: United States, 1944 and 1942-44 (white)*<sup>1</sup>

[Cities are ranked according to the death ratios for 1942-44 by place of residence]

Rank	City	Death ratio 1942-44	Death ratio 1944	Death ratio 1942-43	Rank	City	Death ratio 1942-44	Death ratio 1944	Death ratio 1942-43
1	Salt Lake City, Utah.....	1.3	1.2	1.4	46	Gary, Ind.....	3.4	2.4	3.9
2	Grand Rapids, Mich.....	1.7	1.5	1.8	46	Paterson, N. J.....	3.4	2.6	3.8
3	Spokane, Wash.....	1.7	1.7	1.7	46	Washington, D. C.....	3.4	3.8	3.2
4	Des Moines, Iowa.....	1.8	2.1	1.7	50	Hartford, Conn.....	3.5	2.7	3.3
4	Long Beach, Calif.....	1.8	1.9	1.8	51	Newark, N. J.....	3.5	3.0	3.7
6	Duluth, Minn.....	1.9	1.7	2.0	51	Oklahoma City, Okla.....	3.5	3.2	3.7
7	Norfolk, Va.....	2.0	1.7	2.2	51	Providence, R. I.....	3.5	3.6	3.4
8	Wichita, Kans.....	2.1	1.4	2.5	51	Reading, Pa.....	3.5	3.5	3.4
9	Charlotte, N. C.....	2.2	1.8	2.4	51	Richmond, Va.....	3.5	2.7	3.9
9	Minneapolis, Minn.....	2.2	2.5	2.1	51	Scranton, Pa.....	3.5	3.0	3.8
9	Springfield, Mass.....	2.2	1.5	2.6	51	Yonkers, Ohio.....	3.5	2.6	4.0
12	Syracuse, N. Y.....	2.3	2.1	2.4	58	Bridgeport, Conn.....	3.6	3.9	3.4
12	Utica, N. Y.....	2.3	2.5	2.1	58	Cincinnati, Ohio.....	3.6	3.9	3.5
12	Wilmington, Del.....	2.3	2.6	2.2	58	Fort Worth, Tex.....	3.6	2.9	3.9
15	Somerville, Mass.....	2.4	2.1	2.6	58	New York, N. Y.....	3.6	3.6	3.7
16	Portland, Oreg.....	2.5	2.5	2.4	58	Seattle, Wash.....	3.6	3.8	3.5
17	Flint, Mich.....	2.6	2.1	2.8	63	Cleveland, Ohio.....	3.7	3.5	3.9
18	Kansas City, Mo.....	2.7	2.7	2.7	63	Knoxville, Tenn.....	3.7	3.9	3.7
18	Lowell, Mass.....	2.7	2.7	2.7	63	Louisville, Ky.....	3.7	3.9	3.5
20	Elizabeth, N. J.....	2.8	2.9	2.8	63	Memphis, Tenn.....	3.7	4.0	3.5
20	Jacksonville, Fla.....	2.8	2.7	2.9	63	Chicago, Ill.....	3.7	3.6	3.8
20	Omaha, Nebr.....	2.8	3.4	2.5	63	Youngstown, Ohio.....	3.7	2.2	4.5
20	St. Paul, Minn.....	2.8	2.6	3.0	69	Fall River, Mass.....	3.8	4.0	3.7
24	Peoria, Ill.....	2.9	3.7	2.5	69	Milwaukee, Wis.....	3.8	3.9	3.8
25	Canton, Ohio.....	3.0	2.4	3.3	69	San Diego, Calif.....	3.8	4.0	3.7
25	Columbus, Ohio.....	3.0	2.9	3.0	72	Dallas, Tex.....	3.9	3.6	4.1
25	Fort Wayne, Ind.....	3.0	2.2	3.4	72	Dayton, Ohio.....	3.9	3.9	3.9
25	Indianapolis, Ind.....	3.0	3.2	2.9	72	Denver, Colo.....	3.9	3.9	3.8
25	Kansas City, Kans.....	3.0	2.7	3.2	72	Nashville, Tenn.....	3.9	3.9	3.9
25	Rochester, N. Y.....	3.0	3.4	2.8	72	Tampa, Fla.....	3.9	4.1	3.7
25	Tacoma, Wash.....	3.0	2.9	3.1	77	Baltimore, Md.....	4.0	4.0	4.0
32	Akron, Ohio.....	3.1	2.7	3.4	77	Cambridge, Mass.....	4.0	4.1	3.9
32	New Haven, Conn.....	3.1	3.4	2.9	77	San Francisco, Calif.....	4.0	4.2	3.9
32	Pittsburgh, Pa.....	3.1	3.3	3.1	77	Tulsa, Okla.....	4.0	4.3	3.8
32	Worcester, Mass.....	3.1	3.6	2.9	81	New Orleans, La.....	4.1	3.7	4.2
36	Atlanta, Ga.....	3.2	2.5	3.6	82	Los Angeles, Calif.....	4.2	4.0	4.2
36	Camden, N. J.....	3.2	3.1	3.2	83	Detroit, Mich.....	4.3	4.5	4.3
36	Erie, Pa.....	3.2	3.3	3.1	84	Boston, Mass.....	4.6	4.5	4.6
36	Miami, Fla.....	3.2	3.1	3.3	85	Toledo, Ohio.....	4.7	4.4	4.9
36	New Bedford, Mass.....	3.2	3.3	3.2	86	Buffalo, N. Y.....	4.8	5.2	4.5
36	South Bend, Ind.....	3.2	3.8	2.8	87	Houston, Tex.....	5.0	5.2	4.9
36	St. Louis, Mo.....	3.2	2.9	3.3	87	Trenton, N. J.....	5.0	4.0	5.5
43	Birmingham, Ala.....	3.3	4.2	2.8	89	Jersey City, N. J.....	5.2	5.6	5.0
43	Oakland, Calif.....	3.3	3.0	3.5	90	Chattanooga, Tenn.....	5.7	6.2	5.5
43	Philadelphia, Pa.....	3.3	3.3	3.3	91	Sacramento, Calif.....	6.8	6.2	7.2
46	Albany, N. Y.....	3.4	3.6	3.4	92	San Antonio, Tex.....	9.5	8.7	9.9

<sup>1</sup> For cities having a small nonwhite population (less than 20,000 or less than 10 percent of the total population according to the 1940 census) the death ratios for all races are used to approximate those for the white population.

total mortality of the various cities is evident from the distribution of their death ratios. The tuberculosis death ratios for all races in the 92 cities, in 1942-44, range from 1.3 in Salt Lake City to 9.5 in San Antonio, with a median value of 3.8. In 6 cities the ratios for all races were less than 2.0, and in 7 they exceeded 6.0. The ratios for whites in 6 cities were under 2.0, and in only 2 were ratios of more than 6.0 reported. In 80 of the 92 cities, the proportionate mortality for whites fell between 2.0 and 4.9. The median value of the ratios for whites was 3.4. In marked contrast is the ranking of the death ratios for nonwhites in the 40 cities for which data classified by race are available. This extends from 4.3 in Kansas City, Kans., to 16.7

TABLE 4.—*Death ratios per 100 deaths from all causes for tuberculosis (all forms) for 40 cities<sup>1</sup> of over 100,000 population: United States, 1944, 1942-43 and 1942-44 (nonwhite)*

[Cities are ranked according to the death ratios for 1942-44 by place of residence]

Rank	City	Death ratio 1942-44	Death ratio 1944	Death ratio 1942-43
1	Kansas City, Kans.	4.3	3.9	4.5
2	Charlotte, N. C.	4.4	4.0	4.6
3	Fort Worth, Tex.	4.9	4.8	4.9
4	Knoxville, Tenn.	7.2	5.3	8.3
5	Wilmington, Del.	7.4	5.9	8.1
6	Tampa, Fla.	7.6	7.3	7.7
7	Dallas, Tex.	7.7	6.2	8.4
8	Nashville, Tenn.	7.9	6.2	8.6
9	Houston, Tex.	8.0	7.1	8.5
9	Norfolk, Va.	8.0	5.3	9.2
11	Kansas City, Mo.	8.5	7.6	8.9
12	New Orleans, La.	8.8	8.4	9.0
12	Tulsa, Okla.	8.8	8.4	9.0
14	Richmond, Va.	9.0	10.6	8.2
15	Atlanta, Ga.	9.1	8.2	9.4
15	Memphis, Tenn.	9.1	8.0	9.6
17	Louisville, Ky.	9.2	10.7	8.5
17	St. Louis, Mo.	9.2	8.5	9.5
19	Birmingham, Ala.	9.6	9.4	9.7
19	Camden, N. J.	9.6	9.0	9.9
21	Gary, Ind.	9.7	6.5	11.2
21	Jacksonville, Fla.	9.7	8.9	10.1
23	Indianapolis, Ind.	9.9	9.3	10.2
24	Columbus, Ohio	10.0	10.2	9.9
25	Chattanooga, Tenn.	11.2	8.6	12.3
26	Washington, D. C.	11.6	11.8	11.6
27	Pittsburgh, Pa.	11.8	10.7	12.4
28	Dayton, Ohio	12.3	11.2	12.8
29	Los Angeles, Calif.	12.6	12.5	12.6
30	Philadelphia, Pa.	12.8	13.1	12.6
31	Baltimore, Md.	13.0	13.3	12.9
32	Boston, Mass.	13.6	12.8	14.0
32	Miami, Fla.	13.6	15.0	12.9
34	Chicago, Ill.	13.8	13.2	14.1
35	Cleveland, Ohio	14.6	14.4	14.6
36	Cincinnati, Ohio	15.6	15.9	15.4
37	San Francisco, Calif.	15.8	17.2	15.0
38	New York, N. Y.	15.9	15.7	16.0
39	Detroit, Mich.	16.1	15.5	16.4
40	Newark, N. J.	16.7	17.7	16.2

<sup>1</sup> Cities shown in this table are those in which the nonwhite population constitutes at least 10 percent of the total population or numbers 20,000 or more according to the 1940 census.

in Newark, only at its lower end overlapping the array for whites. In only 3 cities are the ratios less than 6.0, and ratios greater than 15.0 are reported in 5 cities. The median value was 9.6.

For most cities the death ratios for the two periods 1942-43 and 1944, which make up the 3-year period 1942-44, are much the same; in some cities, however, the differences between the ratios are relatively large. In order to evaluate the differences, they were tested for statistical significance.<sup>4</sup> The only increases in the ratios for 1944 over those for 1942-43 that were indicated as statistically significant were those for all races in Buffalo, Louisville, and Omaha, for whites<sup>5</sup> in Birmingham and Washington, and for nonwhites in Richmond. Significant decreases were found in the ratios for all races in 13 cities—Atlanta, Dallas, Fort Wayne, Gary, Norfolk, Paterson, San Antonio, Springfield (Massachusetts), St. Louis, Trenton, Wichita, Yonkers,

<sup>4</sup> A difference equal to or greater than twice the standard error of the difference was considered statistically significant.

and Youngstown; for whites <sup>5</sup> in 5 cities—Atlanta, Gary, Newark, Richmond, and St. Louis; and for nonwhites in 4 cities—Chattanooga, Gary, Nashville, and Norfolk.

A review of the death ratios for each city for 1939–41, 1942–43, and 1944 discloses that the ratios in some cities have been rising steadily over the three periods. These cities are as follows: for all races—Buffalo, Cambridge, Cincinnati, Louisville, Peoria, and Worcester; for whites <sup>5</sup>—Cincinnati, Louisville, and Tampa; and for nonwhites—Louisville.

#### DEATHS FROM RESPIRATORY TUBERCULOSIS OCCURRING IN INSTITUTIONS

Isolation of the infectious cases of tuberculosis, always a major part of a control program, is of the greatest importance in the large cities, where because of the crowded, fluid conditions of urban living, the contacts of an infectious case are likely to be more numerous than in small communities. A partial indication of the extent of such isolation may be gained from the statistics giving the number of deaths from respiratory tuberculosis among the residents of the large cities by type of institution in which the deaths occurred. However, since length of stay in an institution, which is directly related to the effectiveness of hospitalization, is not known, conclusions based only on mortality statistics should be cautiously drawn.

Of the 18,275 deaths from respiratory tuberculosis that occurred among residents of the large cities in 1944, 4,017, or 22.0 percent, were in the home, while 14,258, or 78.0 percent, were in institutions (table 5). In the country as a whole, only 64.0 percent of such deaths were in institutions, while 36.0 percent were in homes. Tuberculosis deaths in general hospitals accounted for 41.6 percent of the total in

TABLE 5.—*Number and percent of deaths from respiratory tuberculosis, in institutions by type of service and type of control: United States and 92 cities of over 100,000 population, 1944*

[By place of residence]

Type of service and type of control	United States		92 cities	
	Number	Percent	Number	Percent
Total.....	50,712	100.0	18,275	100.0
Deaths not in institution.....	18,241	36.0	4,017	22.0
Deaths in institution.....	32,471	64.0	14,258	78.0
Type of service:				
General hospital.....	12,607	24.9	7,601	41.6
Tuberculosis hospital.....	14,496	28.6	5,879	32.2
Nervous and mental institutions.....	4,086	8.0	284	1.5
Other institutions.....	1,312	2.6	494	2.7
Type of control:				
Federal.....	3,428	6.8	1,243	6.8
State.....	7,968	15.7	965	5.3
County and city.....	15,153	29.9	9,528	52.1
Nonprofit.....	4,805	9.5	2,252	12.3
Proprietary and unknown.....	1,112	2.2	270	1.5

<sup>5</sup> Only the cities are listed for which deaths of whites and nonwhites were tabulated separately.

the cities, while 5,879, or 32.2 percent, occurred in tuberculosis sanatoria. The national picture was the reverse of this, since a higher percentage of respiratory tuberculosis deaths (28.6 percent) occurred in tuberculosis institutions than in general hospitals (24.9). Only 1.6 percent of the deaths among city residents were in nervous and mental institutions, contrasted with 8.0 percent nationally.

TABLE 6.—Percent of deaths from respiratory tuberculosis in institutions by type of service, by race and sex, for 92 cities of over 100,000 population and United States: 1944

[By place of residence]

Race and sex	92 Cities					United States				
	Not in institution	In general hospital	In tuberculosis hospital	In nervous and mental institution	In other institution	Not in institution	In general hospital	In tuberculosis hospital	In nervous and mental institution	In other institution
All races, both sexes.....	22.0	41.6	32.2	1.6	2.7	36.0	24.8	28.6	8.0	2.6
Male.....	19.0	44.7	32.2	1.4	2.7	31.3	28.5	29.6	7.7	2.9
Female.....	27.9	35.5	32.1	1.8	2.6	43.4	19.0	28.9	8.6	2.1
White <sup>1</sup> male.....	19.8	42.6	33.0	1.7	2.9	31.4	27.3	29.8	8.5	2.9
White <sup>1</sup> female.....	31.0	30.6	30.0	2.2	3.2	44.0	17.2	26.5	9.9	2.3
Nonwhite <sup>2</sup> male.....	16.4	51.0	29.7	.6	2.3	31.2	32.2	29.0	4.8	2.8
Nonwhite <sup>2</sup> female.....	22.6	44.2	30.6	1.0	1.6	42.4	22.7	27.8	5.6	1.5

<sup>1</sup> For cities having small nonwhite population (less than 20,000 or less than 10 percent of the total population according to the 1940 census) the data for all races are used to approximate those for the white population.

<sup>2</sup> Based on data for only those cities in which the nonwhite population constitutes at least 10 percent of the total population or numbers 20,000 or more according to the 1940 census.

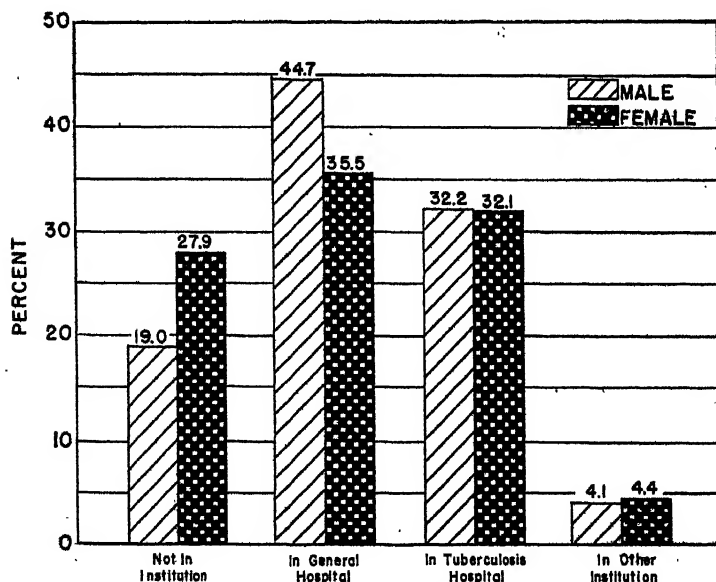


FIGURE 2.—Percentage of deaths from respiratory tuberculosis among males and females by type of institution, for residents of 92 cities of over 100,000 population: United States, 1944

The distribution of the respiratory tuberculosis deaths in the 92 cities by type of institutional control also diverges from the national pattern. More than half (52.1 percent) of all such deaths among residents of the large cities occurred in city and county institutions—ten times as many as in State hospitals (5.3 percent). On the other hand, only 29.9 percent of the national total were in hospitals under control of city or county, and half as many (15.7 percent) occurred in institutions operated by States. A slightly larger percent (12.3) of the deaths among the city residents were in nonprofit institutions than was true for the entire country (9.5).

The small proportion of deaths of city residents in State institutions may be partially explained by the rule that deaths of patients resident there for over a year are allocated to the place in which the institution is located. Hence, the death in a State hospital of a city's resident affected by this rule would not be included in the mortality tabulation for that city, unless the institution was situated within the city limits. It may also be true, however, that the larger, and generally wealthier cities are better able to provide their own hospitals than are the smaller communities, and therefore would be less dependent upon State institutions.

TABLE 7.—Percent of deaths from respiratory tuberculosis occurring in institutions, by type of service and number of deaths from respiratory tuberculosis; 92 cities of over 100,000 population: United States, 1944

[By place of residence]

City	Percent of deaths in—				Number of deaths
	Institutions	General hospitals	Tuberculosis hospitals	Other institutions	
Akron, Ohio.....	56.9	3.4	41.4	12.1	58
Albany, N. Y.....	78.9	66.7	8.8	3.5	57
Atlanta, Ga.....	33.3	10.9	21.8	0.6	156
Baltimore, Md.....	75.8	45.1	28.8	1.8	649
Birmingham, Ala.....	29.6	13.8	15.8	0	196
Boston, Mass.....	89.7	35.4	51.1	3.3	466
Bridgeport, Conn.....	80.3	24.6	55.7	0	61
Buffalo, N. Y.....	79.8	67.7	10.2	1.9	322
Cambridge, Mass.....	86.8	24.5	58.5	3.8	53
Camden, N. J.....	74.1	14.8	57.4	1.9	54
Canton, Ohio.....	36.0	24.0	12.0	0	25
Charlotte, N. C.....	60.0	4.0	52.0	4.0	25
Chattanooga, Tenn.....	59.6	10.1	46.5	3.0	99
Chicago, Ill.....	83.0	43.5	33.4	1.2	1,661
Cincinnati, Ohio.....	81.8	29.2	46.2	6.4	325
Cleveland, Ohio.....	80.9	73.9	3.3	3.7	480
Columbus, Ohio.....	72.4	9.7	44.1	18.6	145
Dallas, Tex.....	51.8	23.2	28.6	0	112
Dayton, Ohio.....	63.6	40.7	11.9	11.0	118
Denver, Colo.....	67.3	51.0	15.0	1.4	147
Des Moines, Iowa.....	78.1	78.1	0	0	32
Detroit, Mich.....	83.1	40.3	46.4	1.4	765
Duluth, Minn.....	94.4	27.8	66.7	0	18
Elizabeth, N. J.....	93.3	18.7	76.7	0	80

TABLE 7.—Percent of deaths from respiratory tuberculosis occurring in institutions by type of service and number of deaths from respiratory tuberculosis; 93 cities of over 100,000 population: United States, 1944—Continued

[By place of residence]

City	Percent of deaths in—				Number of deaths
	Institutions	General hospitals	Tuberculosis hospitals	Other institutions	
Erie, Pa.	50.0	16.7	33.3	0	42
Fall River, Mass.	66.7	11.1	54.0	1.6	63
Flint, Mich.	78.3	26.1	52.2	0	23
Fort Wayne, Ind.	67.9	21.4	28.6	17.9	28
Fort Worth, Tex.	54.7	29.7	25.0	0	64
Gary, Ind.	50.0	26.5	23.5	0	34
Grand Rapids, Mich.	63.6	22.7	40.9	0	22
Hartford, Conn.	85.5	37.1	46.8	1.6	62
Houston, Tex.	56.1	29.7	25.2	1.2	246
Indianapolis, Ind.	61.8	47.2	7.0	7.5	199
Jacksonville, Fla.	71.4	26.2	42.9	2.4	126
Jersey City, N. J.	83.4	23.4	60.0	0	175
Kansas City, Kans.	56.8	48.6	8.1	0	37
Kansas City, Mo.	83.1	45.6	35.0	2.5	160
Knoxville, Tenn.	45.8	27.1	18.8	0	48
Long Beach, Calif.	67.5	52.5	12.5	2.5	40
Los Angeles, Calif.	82.2	60.0	20.1	2.1	824
Louisville, Ky.	75.5	23.1	52.4	0	208
Lowell, Mass.	78.8	12.1	6.1	60.6	33
Memphis, Tenn.	64.2	23.7	40.5	0	173
Miami, Fla.	85.0	82.2	9	1.9	107
Milwaukee, Wis.	89.0	24.3	57.9	1.9	235
Minneapolis, Minn.	86.0	37.4	48.6	0	107
Nashville, Tenn.	41.9	12.9	23.7	5.4	93
Newark, N. J.	86.0	45.5	39.6	9	235
New Bedford, Mass.	75.7	16.2	58.5	0	37
New Haven, Conn.	81.0	33.3	47.6	0	63
New Orleans, La.	62.1	60.2	1.8	0	327
New York, N. Y.	85.8	42.0	39.5	4.2	3,306
Norfolk, Va.	57.6	35.6	22.0	0	59
Oakland, Calif.	81.9	41.9	39.0	1.0	105
Oklahoma City, Okla.	71.4	10.7	44.6	16.1	56
Omaha, Nebr.	78.5	72.2	6.3	0	79
Paterson, N. J.	73.5	17.6	52.9	2.9	34
Peoria, Ill.	78.4	13.5	62.2	2.7	37
Philadelphia, Pa.	82.0	64.9	9.2	7.9	1,104
Pittsburgh, Pa.	68.8	16.3	50.0	2.5	320
Portland, Oreg.	72.3	21.3	50.0	1.1	94
Providence, R. I.	86.4	18.4	28.2	30.8	103
Reading, Pa.	61.9	16.7	45.2	0	42
Richmond, Va.	79.4	16.7	61.1	1.6	126
Rochester, N. Y.	83.6	20.8	45.6	13.2	114
Sacramento, Calif.	92.9	35.4	55.6	2.0	90
St. Louis, Mo.	83.2	48.8	12.2	22.2	369
St. Paul, Minn.	90.0	84.3	5.7	0	70
Salt Lake City, Utah	86.7	66.7	20.0	0	15
San Antonio, Tex.	29.0	13.7	14.7	0.7	300
San Diego, Calif.	84.0	27.0	66.0	1.0	100
San Francisco, Calif.	83.1	56.1	23.7	3.3	396
Scranton, Pa.	61.4	20.5	40.9	0	44
Seattle, Wash.	83.5	51.7	29.5	2.3	176
Somerville, Mass.	68.2	22.7	45.5	0	22
South Bend, Ind.	51.5	12.1	39.4	0	33
Spokane, Wash.	87.5	29.2	60.0	8.3	24
Springfield, Mass.	91.3	30.4	13.0	47.8	23
Syracuse, N. Y.	75.6	31.9	44.7	0	47
Tacoma, Wash.	84.1	22.7	61.4	0	44
Tampa, Fla.	68.8	14.1	53.1	1.6	64
Toledo, Ohio	78.3	8.3	47.8	22.3	157
Trenton, N. J.	76.6	7.8	48.4	20.3	64
Tulsa, Okla.	44.8	20.9	19.4	4.5	67
Utica, N. Y.	73.5	8.8	23.5	41.1	34
Washington, D. C.	89.8	53.0	26.6	5.1	488
Wichita, Kans.	70.6	35.3	35.3	0	17
Wilmington, Del.	65.9	14.6	48.8	2.4	41
Worcester, Mass.	98.0	7.0	60.5	25.6	86
Yonkers, N. Y.	73.5	26.5	47.1	0	34
Youngstown, Ohio	75.7	18.9	55.3	0	37

Analysis by race and sex of the institutional distribution of deaths from respiratory tuberculosis in the United States in 1944<sup>1</sup> has shown an interesting difference between the proportion of deaths in each sex group occurring in institutions. Among males, 31.3 percent of the deaths occurred in the home, while among females, this proportion was 43.4 percent. A similar distribution is found in the large cities. Here, 19.0 percent of the deaths among males were in the home, contrasted with 27.9 percent of those among females. This difference was also found for both races. Nationally, this sex differential in the proportion of respiratory tuberculosis deaths in the home was

TABLE 8.—Number of deaths from tuberculosis (all forms) by race, for 92 cities of over 100,000 population: United States, 1944

[By place of residence]

City	All races	White <sup>1</sup>	Nonwhite <sup>2</sup>	City	All races	White <sup>1</sup>	Nonwhite <sup>2</sup>
Akron, Ohio.....	64	64	-----	Minneapolis, Minn.....	120	120	-----
Albany, N. Y.....	65	65	-----	Nashville, Tenn.....	99	52	47
Atlanta, Ga.....	177	47	130	Newark, N. J.....	253	128	125
Baltimore, Md.....	710	332	378	New Bedford, Mass.....	40	40	-----
Birmingham, Ala.....	217	68	149	New Haven, Conn.....	67	67	-----
Boston, Mass.....	491	430	61	New Orleans, La.....	541	152	189
Bridgeport, Conn.....	63	63	-----	New York, N. Y.....	3,561	2,555	1,006
Buffalo, N. Y.....	347	347	-----	Norfolk, Va.....	64	20	44
Cambridge, Mass.....	58	58	-----	Oakland, Calif.....	125	126	-----
Camden, N. J.....	56	37	19	Oklahoma City, Okla.....	61	61	-----
Canton, Ohio.....	27	27	-----	Omaha, Nebr.....	34	34	-----
Charlotte, N. C.....	26	10	16	Paterson, N. J.....	40	40	-----
Chattanooga, Tenn.....	106	58	47	Peoria, Ill.....	42	42	-----
Chicago, Ill.....	1,798	1,173	625	Philadelphia, Pa.....	1,187	687	500
Cincinnati, Ohio.....	361	207	154	Pittsburgh, Pa.....	346	225	111
Cleveland, Ohio.....	497	305	191	Portland, Oreg.....	108	108	-----
Columbus, Ohio.....	161	101	60	Providence, R. I.....	108	108	-----
Dallas, Tex.....	125	82	43	Reading, Pa.....	45	45	-----
Dayton, Ohio.....	132	98	34	Richmond, Va.....	140	44	96
Denver, Colo.....	169	169	-----	Rochester, N. Y.....	123	123	-----
Des Moines, Iowa.....	34	34	-----	Sacramento, Calif.....	106	106	-----
Detroit, Mich.....	869	556	303	St. Louis, Mo.....	403	241	162
Duluth, Minn.....	20	20	-----	St. Paul, Minn.....	76	76	-----
Elizabeth, N. J.....	33	33	-----	Salt Lake City, Utah.....	18	18	-----
Erie, Pa.....	43	43	-----	San Antonio, Tex.....	325	325	-----
Fall River, Mass.....	64	64	-----	San Diego, Calif.....	112	112	-----
Fint, Mich.....	27	27	-----	San Francisco, Calif.....	430	362	77
Fort Wayne, Ind.....	30	30	-----	Scranton, Pa.....	47	47	-----
Fort Worth, Tex.....	65	45	17	Seattle, Wash.....	203	203	-----
Gary, Ind.....	39	19	20	Somerville, Mass.....	23	23	-----
Grand Rapids, Mich.....	28	28	-----	South Bend, Ind.....	37	37	-----
Hartford, Conn.....	67	67	-----	Spokane, Wash.....	28	28	-----
Houston, Tex.....	262	171	91	Springfield, Mass.....	24	24	-----
Indianapolis, Ind.....	212	142	76	Syracuse, N. Y.....	51	51	-----
Jacksonville, Fla.....	128	25	93	Tacoma, Wash.....	49	49	-----
Jersey City, N. J.....	180	189	-----	Tampa, Fla.....	68	40	28
Kansas City, Kans.....	39	28	11	Toledo, Ohio.....	169	169	-----
Kansas City, Mo.....	177	122	55	Trenton, N. J.....	68	68	-----
Knoxville, Tenn.....	32	37	15	Tulsa, Okla.....	71	54	17
Long Beach, Calif.....	44	44	-----	Utica, N. Y.....	36	36	-----
Los Angeles, Calif.....	904	749	155	Washington, D. C.....	547	198	349
Louisville, Ky.....	230	135	104	Wichita, Kans.....	19	19	-----
Lowell, Mass.....	34	34	-----	Wilmington, Del.....	46	31	15
Memphis, Tenn.....	197	68	129	Worcester, Mass.....	88	88	-----
Miami, Fla.....	115	50	65	Yonkers, N. Y.....	36	36	-----
Milwaukee, Wis.....	247	247	-----	Youngstown, Ohio.....	38	38	-----

<sup>1</sup> Includes deaths of nonwhites for those cities having a small nonwhite population.

<sup>2</sup> Deaths are shown only for those cities in which the nonwhite population constituted at least 10 percent of the total or numbered 20,000 or more according to the 1940 census.

<sup>3</sup> Yerushalmy, J., and Moriama, I. M.: Tuberculosis mortality in the United States and in each State 1944. *FPP. HEALTH REP.*, 61: 487-516 (1946).



attributable to the relatively greater utilization of general hospitals by males than by females, and this also seems to be the condition in the large cities. Of the deaths from respiratory tuberculosis among females, only 35.5 percent occurred in general hospitals, while 44.7 percent of the deaths among males were in such institutions. The distribution of deaths through the other types of institutions was almost identical for both sexes.

In table 7, there is presented for each city the percent of deaths from respiratory tuberculosis in institutions of all types, in general hospitals, and in tuberculosis hospitals. Since the percentages, based in many cases on a small number of deaths, are liable to considerable chance variation, their use will be rather limited until data for several years are available.

In six cities, over 90 percent of the deaths from respiratory tuberculosis occurred in institutions, and at the other extreme, less than half such deaths in seven cities were in institutions. The median percent was 75.4.

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# PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

August 11–September 7, 1946

The accompanying table (table 1) summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended September 7, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941–45.

TABLE 1.—Number of reported cases of 9 communicable diseases in the United States during the 4-week period August 11–September 7, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941–45

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	844	1,221	957	2,256	3,070	2,233	3,058	2,422	2,805
New England.....	41	11	12	3	54	11	498	212	345
Middle Atlantic.....	55	74	56	32	12	14	719	245	351
East North Central.....	109	81	95	32	66	54	655	612	612
West North Central.....	88	101	80	20	23	34	101	84	184
South Atlantic.....	174	373	300	817	945	816	275	73	329
East South Central.....	96	222	188	175	94	70	50	40	83
West South Central.....	101	237	164	1,038	1,730	1,180	221	173	173
Mountain.....	41	38	40	118	105	159	262	296	217
Pacific.....	109	84	73	21	41	71	277	687	607
	Meningococcus meningitis			Polio myelitis			Scarlet fever		
United States.....	218	299	299	7,129	3,436	3,436	2,163	3,356	2,746
New England.....	10	12	16	166	222	222	156	242	242
Middle Atlantic.....	37	65	65	494	1,107	616	408	539	423
East North Central.....	43	73	73	1,835	709	709	510	757	652
West North Central.....	21	17	17	2,340	267	267	168	305	283
South Atlantic.....	41	33	42	225	313	313	279	527	449
East South Central.....	19	29	29	257	133	133	143	229	217
West South Central.....	13	29	27	410	277	58	122	220	113
Mountain.....	6	10	10	526	166	55	127	98	98
Pacific.....	23	31	31	876	222	137	260	439	301
	Smallpox			Typhoid and paratyphoid fever			Whooping cough <sup>3</sup>		
United States.....	4	10	11	507	671	759	7,636	8,711	11,056
New England.....	0	0	0	30	60	35	712	712	712
Middle Atlantic.....	0	0	0	102	98	97	1,325	2,494	2,328
East North Central.....	3	5	5	68	52	93	2,552	1,885	3,200
West North Central.....	0	3	3	21	33	55	325	334	545
South Atlantic.....	0	1	1	59	130	150	953	1,173	1,189
East South Central.....	0	1	2	43	116	129	190	281	407
West South Central.....	0	0	1	88	114	168	610	725	692
Mountain.....	1	0	0	31	43	40	206	331	475
Pacific.....	0	0	1	42	30	30	328	766	766

<sup>1</sup> Mississippi and New York excluded; New York City included.

<sup>2</sup> Mississippi excluded.

## DISEASES ABOVE MEDIAN PREVALENCE

*Poliomyelitis*.—The number of cases of poliomyelitis rose from 4,453 during the 4 weeks ended August 10 to 7,129 during the 4 weeks ended September 7. It is possible, however, that the peak of the current epidemic was reached during the week ended August 17, the first week of this 4-week period when 1,819 cases were reported. The cases dropped slightly during each of the three succeeding weeks. The number of cases for the 4-week period was more than 2 times that reported for the corresponding period in 1945, which figure (3,436 cases) also represented the 1941–45 median. For the country as a whole the current incidence was the highest recorded for this period in the 18 years for which these weekly data are available. Sixteen States reported more than 80 percent of the total poliomyelitis cases, viz, Minnesota 1,036, Illinois 787, California 711, Wisconsin 457, Missouri 383, New York 353, Colorado 309, Michigan 288, Kansas 231, North Dakota 228, Ohio 191, South Dakota 167, Nebraska 156, Iowa 137, Texas 126, and Washington 114 cases. The New England and Middle Atlantic sections have shown only the normal seasonal increase and the incidence was below the preceding 5-year median in each of these sections. In the South Atlantic region where the current epidemic first made its appearance, the number of cases dropped below the median incidence for this period, but in all other sections the incidence was relatively high, the increases ranging from 1.7 times the median in the East South Central to 9.6 times the median in the Mountain section.

Table 2 shows the total reported cases in geographic sections since the beginning of the year and the incidence by weeks since the first of July, with corresponding data for the three preceding years. Reports indicate that in the South Atlantic, South Central and Mountain sections where the disease first made its appearance in epidemic form about the first of June, the highest weekly incidence was not reached until the middle of August or later, while in the North Central section where the increase did not occur until several weeks later, the peak was reached during the week ended August 10. In the East North Central and Pacific sections the largest numbers of cases were not reported until the week ended August 31. While there was an increase in some sections during the week ended September 7 over the preceding week, the peak seems to have been passed; in most preceding years the highest incidence has been reported during this 4-week period ending early in September.

*Influenza*.—The incidence of influenza was about normal for this season of the year, the number of cases (2,256) being only slightly above the 1941–45 median. The current incidence was less than 75 percent of the number of cases reported for this period in 1945 when

the disease was unusually prevalent in the State of Texas. The Middle Atlantic and East South Central sections reported a few more cases than might normally be expected, but in all other sections the incidence was lower than the median expectancy.

TABLE 2.—Number of cases of poliomyelitis reported in each geographic area during 1946, 1945, 1944, and 1943<sup>1</sup>

Geographic area	Total Jan. 1- Sept. 7	Week ended—									
		July				Aug.					Sept.
		6	13	20	27	3	10	17	24	31	7
<b>All regions:</b>											
1946.....	14,168	309	428	670	913	1,286	1,584	1,819	1,808	1,781	1,721
1945.....	7,043	154	254	369	391	474	701	694	931	917	891
1944.....	10,978	290	462	568	738	932	1,015	1,260	1,529	1,680	1,498
1943.....	6,792	245	297	329	361	450	545	747	872	986	906
<b>New England:</b>											
1946.....	290	4	8	20	18	25	23	47	41	37	41
1945.....	427	11	8	26	34	32	53	38	62	63	59
1944.....	397	4	8	9	12	36	37	54	74	75	64
1943.....	384	1	6	3	11	32	36	62	62	77	63
<b>Middle Atlantic:</b>											
1946.....	939	14	22	40	46	66	100	95	139	124	136
1945.....	2,091	31	56	95	120	196	227	232	344	295	236
1944.....	4,687	62	125	216	304	413	449	601	756	895	761
1943.....	425	6	14	12	13	20	38	46	57	72	83
<b>East North Central:</b>											
1946.....	2,812	24	54	71	146	248	282	388	422	542	483
1945.....	1,053	10	17	19	27	51	113	121	189	177	222
1944.....	1,714	21	58	63	111	143	178	215	271	321	255
1943.....	1,136	8	4	12	21	46	79	144	241	249	273
<b>West North Central:</b>											
1946.....	4,397	45	98	213	328	556	703	696	604	490	550
1945.....	390	5	7	14	8	15	29	33	49	97	83
1944.....	551	9	8	25	22	28	54	67	104	77	112
1943.....	875	9	15	12	40	61	117	118	131	183	138
<b>South Atlantic:</b>											
1946.....	882	54	39	42	54	55	32	55	63	52	55
1945.....	809	23	42	68	55	45	78	76	86	80	71
1944.....	1,886	123	126	128	136	167	167	195	214	205	187
1943.....	130	1	6	9	7	5	8	7	10	8	10
<b>East South Central:</b>											
1946.....	734	40	26	59	52	36	91	71	72	68	46
1945.....	472	25	35	26	42	28	35	47	37	30	39
1944.....	798	37	91	90	101	84	67	53	56	48	57
1943.....	176	6	5	6	14	11	5	29	20	14	12
<b>West South Central:</b>											
1946.....	1,494	80	107	109	121	122	110	129	103	76	102
1945.....	969	30	57	78	58	58	78	79	86	60	52
1944.....	361	17	26	18	22	27	23	16	11	14	17
1943.....	1,516	137	148	148	141	122	119	104	117	81	90
<b>Mountain:</b>											
1946.....	1,087	29	39	75	76	100	101	147	126	131	122
1945.....	280	1	3	13	16	18	29	17	35	55	59
1944.....	117	6	2	1	4	4	9	12	16	12	15
1943.....	464	2	9	11	4	29	23	43	47	123	93
<b>Pacific:</b>											
1946.....	1,533	19	35	41	72	78	142	191	238	261	186
1945.....	552	18	29	30	31	31	59	49	43	60	70
1944.....	467	11	18	18	26	30	31	47	27	33	30
1943.....	1,686	75	90	116	110	124	120	194	187	149	144

<sup>1</sup>A similar table for earlier weeks appeared in Public Health Reports for Sept. 6, 1946.

**Measles.**—The number of cases of measles dropped from 10,863 during the preceding 4-week period to 3,058 during the current period. The number was, however, about 25 percent above the 1945 figure for the corresponding period and almost 15 percent above the 1941-45 median. Of the nine geographic sections, five reported an excess over the preceding 5-year median.

## DISEASES BELOW MEDIAN PREVALENCE

*Diphtheria.*—For the 4 weeks ended September 7 there were 844 cases of diphtheria reported as compared with 1,221 for the corresponding 4-week period in 1945 and a 5-year median of 957 cases. The incidence was relatively high in the New England, Middle Atlantic, East North Central, and Pacific sections; about normal in the West North Central and Mountain sections, and considerably below the the normal seasonal expectancy in the South Atlantic and South Central sections. For the second consecutive 4-week period since September 1944 the current incidence was less than that of the corresponding period of the preceding year, and for the first time since March 1945 the incidence for a current 4-week period fell below its preceding 5-year median. The rising tide of diphtheria which has been in progress for the last 2 years seems to have started to recede.

*Meningococcus meningitis.*—The incidence of this disease (218 cases) was lower than the 1941-45 median, which was represented by the 1945 report (299 cases). The numbers of cases reported in the New England, West North Central, South Atlantic, and Mountain sections were about normal, but in the other five geographic sections the incidence was comparatively low. For the country as a whole the current incidence was the lowest since 1942 when 187 cases were reported for the corresponding 4 weeks.

*Scarlet fever.*—The number of cases (2,163) of scarlet fever reported for the current 4-week period was less than 65 percent of the incidence for the corresponding period in 1945 and about 80 percent of the 1941-45 median. In the West North Central and Mountain sections the incidence was higher than the preceding 5-year median, but in all other sections the incidence was relatively low. For the entire country the current incidence is the lowest in the 18 years for which these data are available.

*Smallpox.*—The number of cases (4) of smallpox was the lowest reported during any 4-week period on record. Two of the reported cases occurred in Ohio, one in Wisconsin, and one in Idaho. The 1941-45 median for this period was 11 cases.

*Typhoid and paratyphoid fever.*—The number of cases of these diseases was also relatively low, 507 cases being reported for the 4 weeks ended September 7 as compared with 671 for the corresponding 4 weeks in 1945 and a preceding 5-year median of 759 cases. In the North Atlantic and Mountain sections the numbers of cases were somewhat above the normal seasonal incidence, but in all other sections the incidence was below normal.

*Whooping cough.*—The number of cases (7,686) of whooping cough was less than 90 percent of the incidence during the same period in 1945 and about 70 percent of the 1941-45 median. The incidence

was normal in the New England section, but considerably below the preceding 5-year medians in all other sections. For the country as a whole the current incidence was the lowest in the 9 years for which these data are available

#### MORTALITY, ALL CAUSES

For the 4 weeks ended September 7 there were 31,589 deaths from all causes reported to the Bureau of the Census by 93 large cities. The preceding 3-year average for the corresponding weeks was 31,825 deaths. The number of deaths was lower than the average in the first, third and fourth weeks of the current period, and higher than the 3-year average in the second week of the 4-week period. In 1945 the total number of deaths reported for the corresponding 4 weeks was 31,548.

#### DEATHS DURING WEEK ENDED SEPTEMBER 7, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 7, 1946	Correspond- ing week, 1945
Data for 92 large cities of the United States:		
Total deaths.....	7,877	8,087
Average for 3 prior years.....	7,776	
Total deaths, first 36 weeks of year.....	327,895	323,899
Deaths under 1 year of age.....	675	615
Average for 3 prior years.....	618	
Deaths under 1 year of age, first 36 weeks of year.....	22,877	21,702
Data from industrial insurance companies:		
Policies in force.....	67,323,407	67,334,914
Number of death claims.....	8,303	8,463
Death claims per 1,000 policies in force, annual rate.....	6.4	7.3
Death claims per 1,000 policies, first 36 weeks of year, annual rate.....	9.7	10.3

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 14, 1946

#### Summary

The incidence of poliomyelitis declined for the country as a whole for the fourth consecutive week. A total of 1,623 cases was reported, as compared with 1,726 last week and a 5-year (1941-45) median of 962. The highest weekly incidence reported so far this year was 1,814 cases for the week ended August 17, as compared with 1,683 cases for the peak week of 1944 (September 2). Decreases were recorded currently in all of the nine geographic divisions except the New England and Pacific. Of the 39 States reporting 5 or more cases and showing changes, 20 recorded an increase of 123 cases, while 19 reported a decline of 216. The 25 States reporting more than 15 cases are as follows (last week's figures in parentheses): *Increases*—Massachusetts 33 (16), New Jersey 16 (15), Ohio 55 (52), Michigan 74 (55), Iowa 42 (30), Kansas 64 (50), Florida 17 (16), Louisiana 21 (16), Texas 28 (25), New Mexico 19 (15), Washington 40 (28), Oregon 17 (12), California 153 (146); *decreases*—New York 87 (101), Pennsylvania 19 (20), Indiana 29 (47), Illinois 193 (199), Wisconsin 121 (130), Minnesota 187 (199), Missouri 95 (120), North Dakota 35 (66), South Dakota 19 (45), Nebraska 38 (40), Arkansas 19 (33), Colorado 65 (72). The total for the year to date is 15,777, as compared with 8,009 and 12,412, respectively, for the corresponding periods of last year and 1944, and a 5-year median of 7,812.

Of the total of 273 cases of diphtheria reported, as compared with 221 last week and a 5-year median of 310, Texas reported 35, New York 24, California 18, and Mississippi 14. The cumulative total is 10,828, as compared with 9,750 for the corresponding period last year. The largest numerical increases over 1945 have been in the Middle Atlantic (562) and the East North Central (693) areas. A combined increase of 2,275 has been reported in 27 States and the District of Columbia, offset in part by a decrease of 1,197 in 20 other States, notably Texas (306), Alabama (123), South Carolina (117), Michigan (92) and California (90).

Deaths recorded for the week in 93 large cities of the United States totaled 8,607, as compared with 7,914 last week, 8,238 and 7,817, respectively, for the corresponding weeks in 1945 and 1944, and a 3-year (1943-45) average of 8,023. The cumulative figure is 337,587, as compared with 333,343 for the same period last year.

*Telegraphic morbidity reports from State health officers for the week ended Sept. 14, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Sept. 14, 1946	Sept. 15, 1945		Sept. 14, 1946	Sept. 15, 1945		Sept. 14, 1946	Sept. 15, 1945		Sept. 14, 1946	Sept. 15, 1945	
NEW ENGLAND												
Maine.....	1	1	0	-----	-----	-----	35	2	3	0	1	1
New Hampshire.....	0	0	0	-----	-----	-----	4	1	1	0	0	0
Vermont.....	1	2	0	-----	-----	-----	7	6	4	0	0	0
Massachusetts.....	4	1	2	-----	-----	-----	29	40	31	0	1	3
Rhode Island.....	0	0	0	-----	11	-----	4	3	3	2	0	0
Connecticut.....	3	0	0	-----	1	1	8	-----	5	1	1	1
MIDDLE ATLANTIC												
New York.....	24	10	8	14	11	(1)	67	23	32	4	9	9
New Jersey.....	3	4	2	3	1	4	9	18	19	2	2	2
Pennsylvania.....	10	3	5	1	1	-----	32	43	26	6	8	8
EAST NORTH CENTRAL												
Ohio.....	6	6	6	3	2	2	35	2	12	1	1	3
Indiana.....	3	5	4	4	-----	4	-----	5	4	2	2	1
Illinois.....	11	0	8	2	2	2	14	42	20	2	8	8
Michigan <sup>1</sup> .....	5	16	4	1	2	2	11	43	43	1	4	4
Wisconsin.....	0	1	0	9	17	16	21	19	40	0	1	1
WEST NORTH CENTRAL												
Minnesota.....	3	4	4	-----	-----	-----	1	2	4	1	1	0
Iowa.....	0	3	3	-----	-----	-----	3	1	2	1	2	0
Missouri.....	3	4	3	1	1	-----	1	4	3	0	4	2
North Dakota.....	1	2	1	-----	-----	-----	1	1	-----	0	0	0
South Dakota.....	0	7	3	-----	-----	-----	-----	2	2	0	3	0
Nebraska.....	2	4	4	-----	-----	-----	2	-----	1	0	0	0
Kansas.....	10	6	3	1	-----	-----	9	6	5	0	3	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	-----	-----	-----	2	-----	-----	0	0	0
Maryland <sup>1</sup> .....	7	7	1	1	-----	-----	9	1	5	1	0	0
District of Columbia.....	0	0	0	-----	-----	-----	5	2	1	0	0	0
Virginia.....	10	18	7	108	123	74	12	1	5	3	3	3
West Virginia.....	3	14	8	-----	-----	-----	2	-----	2	1	4	2
North Carolina.....	10	33	40	-----	-----	-----	5	1	7	1	0	1
South Carolina.....	1	17	19	39	39	123	1	12	6	0	1	1
Georgia.....	13	33	24	13	6	7	7	3	3	0	1	0
Florida.....	10	5	4	-----	1	1	2	1	4	1	1	1
EAST SOUTH CENTRAL												
Kentucky.....	7	15	8	-----	2	-----	-----	5	5	0	1	1
Tennessee.....	5	31	14	5	2	6	2	3	5	0	3	3
Alabama.....	12	30	19	25	28	10	3	-----	2	3	1	1
Mississippi <sup>1</sup> .....	14	18	12	-----	-----	-----	-----	-----	-----	2	2	0
WEST SOUTH CENTRAL												
Arkansas.....	8	13	11	6	15	7	10	-----	4	0	1	1
Louisiana.....	5	13	6	8	11	3	-----	-----	-----	3	2	1
Oklahoma.....	3	5	7	8	20	8	4	2	2	0	0	0
Texas.....	35	54	30	328	517	259	14	31	28	3	8	2
MOUNTAIN												
Montana.....	1	0	0	12	16	-----	13	6	3	1	0	0
Idaho.....	2	2	0	3	-----	-----	6	20	1	3	1	0
Wyoming.....	0	0	0	-----	1	1	2	1	1	0	0	0
Colorado.....	3	4	4	16	2	6	2	7	4	0	0	0
New Mexico.....	3	2	2	-----	-----	1	3	1	1	0	0	0
Arizona.....	2	2	1	18	15	34	20	-----	3	0	0	1
Utah <sup>1</sup> .....	1	0	0	-----	25	-----	2	20	8	0	0	0
Nevada.....	0	0	0	-----	-----	-----	-----	-----	-----	0	0	0
PACIFIC												
Washington.....	5	2	3	-----	-----	-----	4	66	15	0	3	2
Oregon.....	5	5	2	-----	3	4	17	14	14	0	1	1
California.....	18	24	16	3	10	14	47	101	74	5	9	9
Total.....	273	446	310	623	928	657	487	561	561	50	93	98
37 weeks.....	10,828	9,780	8,541	194,096	74,222	84,051	841,118	108,585	540,807	4,666	8,495	8,495

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.



Telegraphic morbidity reports from State health officers for the week ended Sept. 14, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>1</sup>		
	Week ended—		Med-ian, 1941-45	Week ended—		Med-ian, 1941-45	Week ended—		Med-ian, 1941-45	Week ended—		Med-ian, 1941-45
	Sept. 14, 1946	Sept. 15, 1945		Sept. 14, 1946	Sept. 15, 1945		Sept. 14, 1946	Sept. 15, 1945		Sept. 14, 1946	Sept. 15, 1945	
NEW ENGLAND												
Maine.....	2	8	2	23	8	8	0	0	0	0	2	0
New Hampshire.....	11	1	1	4	2	1	0	0	0	0	0	0
Vermont.....	1	0	2	6	2	2	0	0	0	0	0	0
Massachusetts.....	33	45	23	43	42	59	0	0	0	3	1	6
Rhode Island.....	4	0	0	2	3	3	0	0	0	0	1	1
Connecticut.....	6	15	15	8	12	12	0	0	0	1	3	1
MIDDLE ATLANTIC												
New York.....	87	148	109	53	87	79	0	0	0	4	6	7
New Jersey.....	16	87	41	27	25	21	0	0	0	7	6	4
Pennsylvania.....	19	95	63	51	67	57	0	0	0	11	7	9
EAST NORTH CENTRAL												
Ohio.....	55	30	30	47	67	64	2	0	0	9	7	7
Indiana.....	29	8	8	17	15	21	0	0	0	3	6	2
Illinois.....	193	66	52	32	50	49	1	0	0	3	2	6
Michigan <sup>2</sup> .....	74	16	20	32	44	39	0	0	0	4	2	3
Wisconsin.....	121	39	18	27	23	36	0	0	0	1	0	1
WEST NORTH CENTRAL												
Minnesota.....	187	25	24	12	20	20	0	0	0	0	1	1
Iowa.....	42	46	13	12	13	13	0	0	0	2	2	1
Missouri.....	95	24	4	14	14	18	0	0	0	1	1	4
North Dakota.....	35	1	1	0	4	4	0	0	0	0	0	0
South Dakota.....	19	0	1	0	2	4	0	0	0	0	0	0
Nebraska.....	38	18	11	5	12	8	0	0	0	0	0	0
Kansas.....	64	8	9	22	19	22	0	0	0	3	3	3
SOUTH ATLANTIC												
Delaware.....	0	1	1	3	1	1	0	0	0	0	0	0
Maryland <sup>3</sup> .....	5	8	8	13	23	16	0	0	0	1	1	4
District of Columbia.....	0	5	3	2	4	4	0	0	0	0	0	0
Virginia.....	7	19	11	26	32	27	0	1	0	1	6	6
West Virginia.....	7	3	1	28	54	48	1	0	0	1	9	6
North Carolina.....	8	4	4	33	59	40	0	0	0	0	5	5
South Carolina.....	0	5	3	1	12	8	0	0	0	1	1	5
Georgia.....	9	2	4	5	13	15	0	0	0	1	7	7
Florida.....	17	11	4	4	7	5	0	0	0	0	2	1
EAST SOUTH CENTRAL												
Kentucky.....	3	2	5	14	18	24	0	0	0	2	8	9
Tennessee.....	8	15	11	20	21	28	0	0	0	1	2	10
Alabama.....	10	3	3	8	15	23	0	0	0	2	9	6
Mississippi <sup>4</sup> .....	14	3	3	7	12	11	0	0	0	1	3	5
WEST SOUTH CENTRAL												
Arkansas.....	19	5	5	1	7	4	0	1	1	3	9	9
Louisiana.....	21	6	2	2	7	5	0	0	0	4	4	6
Oklahoma.....	11	20	2	2	10	6	0	0	0	5	6	5
Texas.....	28	44	10	24	51	18	0	0	0	13	15	15
MOUNTAIN												
Montana.....	6	10	3	4	1	9	0	0	0	1	0	0
Idaho.....	3	2	1	2	2	3	0	0	0	3	1	0
Wyoming.....	10	1	0	0	3	2	0	0	0	0	0	0
Colorado.....	65	16	7	10	7	12	0	0	0	2	1	3
New Mexico.....	19	2	2	3	13	2	0	0	0	2	2	3
Arizona.....	5	1	1	2	0	1	0	0	0	14	1	1
Utah <sup>5</sup> .....	7	22	3	3	5	5	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	40	25	14	7	9	12	0	0	0	0	0	1
Oregon.....	17	1	6	8	9	9	0	0	0	2	1	1
California.....	153	46	25	62	97	68	0	0	0	1	4	5
Total.....	1,623	962	962	751	1,023	949	7	2	3	114	208	208
37 weeks.....	415,777	8,009	7,812	89,227	138,197	101,240	286	277	619	3,000	3,504	4,008

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 3; New Jersey 1; Ohio 2; Maryland 1; Georgia 1; Louisiana 1; Texas 1; Colorado 1; Oregon 2.

<sup>3</sup> Corrected report: Polio-myelitis, Arkansas, week ended August 24, 37 cases (instead of 35). New Mexico, 2 cases deducted by change of diagnosis.

Telegraphic morbidity reports from State health officers for the week ended Sept. 14, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Sept. 14, 1946							
	Week ended—		Median, 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Typhus fever, endemic	Typhoid fever	Undulant fever
	Sept. 14, 1946	Sept. 15, 1945		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine.....	16	32	24								1
New Hampshire.....			2								
Vermont.....	19	22	22								
Massachusetts.....	143	170	170								
Rhode Island.....	45	13	23								
Connecticut.....	49	36	36								5
MIDDLE ATLANTIC											
New York.....	146	403	319	1	13						2
New Jersey.....	147	201	183		1	1				1	1
Pennsylvania.....	125	186	196				1	1			1
EAST NORTH CENTRAL											
Ohio.....	87	107	139		2	1					2
Indiana.....	13	20	20				1				2
Illinois.....	170	117	139	9	1			1	1		11
Michigan.....	208	172	188	1	4						3
Wisconsin.....	283	61	204								6
WEST NORTH CENTRAL											
Minnesota.....	18	20	37	1							1
Iowa.....	20	9	9	3							4
Missouri.....	17	17	17				1	1	1		3
North Dakota.....	1	4	5								
South Dakota.....		5	11								
Nebraska.....			2								
Kansas.....	21	38	38				1				10
SOUTH ATLANTIC											
Delaware.....	5	3	2								
Maryland.....	43	42	46			1					
District of Columbia.....	2	6	14					1			
Virginia.....	36	48	47			49		4	3		1
West Virginia.....	19	5	18								
North Carolina.....	74	73	73	1				3	3	4	
South Carolina.....	9	84	69		4					1	
Georgia.....	13	19	10	3	2				2	17	1
Florida.....	20	5	5	1						11	1
EAST SOUTH CENTRAL											
Kentucky.....	16	18	40		2			1		1	1
Tennessee.....	21	22	36			2	1		4	2	
Alabama.....	4	20	22							8	
Mississippi.....								1	1	5	7
WEST SOUTH CENTRAL											
Arkansas.....	10	4	18						2	2	1
Louisiana.....	4	7	2	1	2						
Oklahoma.....	13	17	6	2			1			13	2
Texas.....	180	135	99	4	189	16			1	29	13
MOUNTAIN											
Montana.....	9	1	34				1				1
Idaho.....	11	10	5		1						
Wyoming.....	3	3	13								
Colorado.....	9	38	38								3
New Mexico.....	14	8	8			1					
Arizona.....	3	3	10			27	2				
Utah.....	13	4	14								
Nevada.....			1								
PACIFIC											
Washington.....	5	27	36								1
Oregon.....	18	15	15				1				
California.....	73	114	179	1	1		7	1		2	8
Total.....	2,185	2,368	2,772	28	222	98	17	14	18	98	98
Same week, 1945.....	2,363			37	748	391	69	10	14	174	104
Average, 1943-45.....	2,328			38	541	300	35	10	12	168	
37 weeks: 1946.....	72,235			2,062	12,164	4,932	463	512	684	2,478	3,638
1945.....	93,899			1,353	18,768	7,945	424	414	564	8,356	3,434
Average, 1943-45.....	102,070		133,994	1,378	15,614	6,700	474	416	541	2,796	

\* Period ended earlier than Saturday.

\* 5-year median, 1941-45.

Leprosy: New York 1 case; Texas 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 7, 1946

This table lists the reports from 38 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Erysipelas, infections, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	2	0	2	0	1	0	0	3
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	0	2	0	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Massachusetts:												
Boston.....	4	0	-----	0	7	0	10	8	5	0	0	13
Fall River.....	0	0	-----	0	-----	0	2	0	1	0	0	3
Springfield.....	0	0	-----	0	-----	0	0	2	2	0	0	9
Worcester.....	0	0	-----	0	2	0	8	6	1	0	1	32
Rhode Island:												
Providence.....	0	0	1	0	17	0	0	2	1	0	0	16
Connecticut:												
Bridgeport.....	0	0	-----	0	1	0	3	1	0	0	1	-----
Hartford.....	0	0	-----	0	1	0	0	0	0	0	0	3
New Haven.....	0	0	-----	0	3	0	0	0	0	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo.....	0	0	-----	0	1	0	3	0	2	0	0	2
New York.....	6	0	4	1	15	2	30	57	25	0	13	40
Rochester.....	0	0	-----	0	2	0	0	4	2	0	0	-----
Syracuse.....	2	0	-----	0	-----	0	0	5	2	0	0	2
New Jersey:												
Camden.....	2	0	-----	0	-----	1	1	2	0	0	1	-----
Newark.....	0	0	-----	0	4	0	0	0	3	0	0	20
Trenton.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Pennsylvania:												
Philadelphia.....	1	0	1	1	13	2	17	2	3	0	2	22
Pittsburgh.....	0	0	-----	0	3	1	2	7	1	0	1	7
Reading.....	0	0	-----	0	2	0	0	0	0	0	0	5
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0	1	1	-----	0	0	6	1	0	0	10
Cleveland.....	1	0	-----	0	12	0	3	24	5	0	0	16
Columbus.....	0	0	-----	0	-----	0	2	1	1	0	0	11
Indiana:												
Fort Wayne.....	0	0	-----	0	-----	0	0	0	1	0	0	2
Indianapolis.....	1	0	-----	0	-----	0	0	11	2	0	0	7
South Bend.....	0	0	-----	0	-----	0	0	2	0	0	0	-----
Terre Haute.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Illinois:												
Chicago.....	1	0	-----	0	1	2	14	62	15	0	0	81
Springfield.....	0	0	-----	0	-----	0	2	1	0	0	0	-----
Michigan:												
Detroit.....	2	0	-----	0	3	0	1	24	10	0	1	48
Flint.....	0	0	-----	0	1	0	2	2	2	0	0	2
Grand Rapids.....	0	0	-----	0	-----	0	1	7	4	0	0	10
Wisconsin:												
Kenosha.....	0	0	-----	0	-----	0	0	5	0	0	0	5
Milwaukee.....	0	0	-----	0	2	0	1	16	7	0	0	69
Racine.....	0	0	-----	0	2	0	0	3	0	0	0	5
Superior.....	5	0	-----	0	-----	0	0	3	0	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	4	0	-----	0	-----	0	0	13	0	0	0	-----
Minneapolis.....	1	0	-----	0	-----	0	2	34	2	0	0	-----
St. Paul.....	0	0	-----	0	2	0	4	18	0	0	0	4
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	0	21	0	0	0	4
St. Joseph.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
St. Louis.....	0	3	1	1	-----	2	9	41	3	0	0	3

## City reports for week ended Sept. 7, 1946—Continued

	Diphtheria cases	Enecephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomylitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	1	0	—	0	—	1	2	24	1	0	0	1
Kansas:												
Topeka.....	1	0	—	0	—	0	2	0	1	0	0	—
Wichita.....	0	0	—	0	1	0	3	0	0	0	0	1
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	—	0	—	0	2	0	1	0	0	1
Maryland:												
Baltimore.....	4	0	3	2	1	0	4	2	6	0	0	30
Cumberland.....	0	0	—	0	—	0	0	0	0	0	0	—
Frederick.....	0	0	—	0	—	0	0	0	0	0	0	—
District of Columbia:												
Washington.....	0	0	—	0	—	0	5	3	4	0	0	3
Virginia:												
Lynchburg.....	1	0	—	0	—	0	0	0	0	0	0	—
Richmond.....	0	0	—	0	4	0	3	1	0	0	0	6
Roanoke.....	0	0	—	0	—	0	0	0	0	0	1	—
West Virginia:												
Charleston.....	0	1	—	0	—	0	0	0	0	0	0	—
Wheeling.....	0	0	—	0	—	0	0	2	0	0	0	—
North Carolina:												
Wilmington.....	0	0	—	0	—	0	2	0	0	0	0	—
Winston-Salem.....	0	0	—	0	2	0	0	0	3	0	0	5
South Carolina:												
Charleston.....	0	0	—	0	—	0	3	0	0	0	0	—
Georgia:												
Atlanta.....	1	0	—	0	—	0	0	0	1	0	0	—
Brunswick.....	0	0	—	0	—	0	1	0	0	0	0	—
Savannah.....	0	0	—	0	2	0	1	0	0	0	0	—
Florida:												
Tampa.....	1	0	—	0	—	1	2	0	1	0	0	—
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	—	0	—	0	3	5	1	0	0	2
Nashville.....	0	0	—	0	—	0	5	2	0	0	0	—
Alabama:												
Birmingham.....	0	0	3	0	—	0	1	2	0	0	0	—
Mobile.....	0	0	—	0	—	0	2	1	0	0	1	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	1	0	—	0	1	0	0	3	0	0	0	2
Louisiana:												
New Orleans.....	1	0	2	0	—	0	6	3	1	0	0	—
Shreveport.....	0	0	—	0	—	0	3	1	0	0	0	—
Texas:												
Dallas.....	0	0	—	0	—	0	1	0	2	0	0	3
Galveston.....	0	0	—	0	—	0	1	0	0	0	0	—
Houston.....	1	0	—	0	—	0	3	1	1	0	0	—
San Antonio.....	2	0	—	0	—	0	2	1	0	0	0	1
MOUNTAIN												
Montana:												
Billings.....	0	0	—	0	—	0	0	0	0	0	0	—
Great Falls.....	0	0	—	0	2	0	1	1	0	0	0	—
Helena.....	0	0	—	0	—	0	0	0	0	0	0	—
Missoula.....	0	0	—	0	—	0	1	0	3	0	0	—
Idaho:												
Boise.....	0	0	—	0	—	0	2	0	0	0	0	—
Colorado:												
Denver.....	1	0	3	1	1	0	1	19	2	0	0	11
Pueblo.....	0	0	—	0	—	0	2	1	0	0	1	—
Utah:												
Salt Lake City.....	0	0	—	0	2	0	3	1	0	0	0	3

## City reports for week ended Sept. 7, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyellitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	2	0	-----	0	1	1	2	0	1	0	1	4
Spokane.....	0	0	-----	0	-----	0	2	10	0	0	0	1
Tacoma.....	0	0	-----	0	-----	0	0	0	0	0	0	1
California:												
Los Angeles.....	3	0	-----	0	3	1	1	65	0	0	0	-----
Sacramento.....	1	0	-----	0	1	0	0	0	0	0	0	1
San Francisco.....	2	0	-----	0	4	3	2	4	7	0	1	2
Total.....	53	4	19	7	121	17	195	544	138	0	25	536
Corresponding week, 1945.....	63	-----	23	6	133	-----	251	-----	206	0	18	718
Average, 1941-45.....	50	-----	27	17	160	-----	217	-----	230	0	32	899

1 3-year average, 1943-45.

2 5-year median, 1941-45.

Dysentery, amebic.—Cases: Boston 1; New York 1; Indianapolis 1; Detroit 1; Atlanta 1; Los Angeles 1.

Dysentery, bacillary.—Cases: Rochester 3; Chicago 1; Detroit 4; Charleston, S. C., 3; Los Angeles 1.

Dysentery, unspecified.—Cases: San Antonio 4.

Rocky Mountain spotted fever.—Cases: Wilmington, Del., 1; Lynchburg 1.

Typhus fever, endemic.—Cases: Savannah 1; Tampa 2; Nashville 2; Mobile 2; New Orleans 2; Dallas 1; Galveston 1; San Antonio 1; Los Angeles 1.

## Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1943, 34,322,800)

	Diphtheria case rates	Etiophallitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polymyellitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	10.3	0.0	2.6	0.0	86	0.0	65.3	54.9	29	0.0	5.2	212
Middle Atlantic.....	5.1	0.0	2.3	0.9	19	2.8	25.0	35.6	18	0.0	7.9	45
East North Central.....	6.1	0.0	0.6	0.6	13	1.3	18.4	101.6	28	0.0	0.6	163
West North Central.....	14.1	6.0	2.0	2.0	6	6.0	44.2	303.7	14	0.0	0.0	26
South Atlantic.....	11.6	1.7	5.0	3.3	15	1.7	38.1	13.3	27	0.0	1.7	75
East South Central.....	0.0	0.0	17.7	0.0	0	0.0	64.9	59.0	6	0.0	5.9	12
West South Central.....	14.3	0.0	5.7	0.0	3	0.0	45.9	25.8	11	0.0	0.0	17
Mountain.....	7.9	0.0	23.8	7.9	40	0.0	79.4	174.7	40	0.0	7.9	111
Pacific.....	12.7	0.0	0.0	0.0	14	7.9	11.1	124.9	13	0.0	3.2	14
Total.....	8.1	0.6	2.9	1.1	18	2.6	29.7	82.9	21	0.0	3.8	82

## TERRITORIES AND POSSESSIONS

## Hawaii Territory

Plague (in ectoparasites).—Under date of September 12, 1946, plague infection was reported in a pool of 48 fleas recovered from 22 rodents trapped on May 22, 1946, in District 14B, Makawao District, Island of Maui, T. H.

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended August 24, 1946.*—During the week ended August 24, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Que- bec	Ont- ario	Mani- toba	Sas- katch- ewan	Al- berta	British Colum- bia	Total
Chickenpox.....		7		32	44	8	11	26	25	153
Diphtheria.....		5		27	6	2		1	4	45
Dysentery:										
Amoebic.....								1		1
Bacillary.....				3						3
German measles.....					4		1	1	6	12
Influenza.....		3		3						6
Measles.....		3	2	25	70	15	28	49	5	197
Meningitis, meningo- coccus.....		1			3		1			5
Mumps.....		1	1	14	87	11	42	14	40	210
Pollomyelitis.....	6	2	6	134	28	3	2	6	2	189
Scarlet fever.....		5	6	30	21	2	5	8	1	78
Tuberculosis (all forms).....		1	7	140	27	24	15	7	39	260
Typhoid and para- typhoid fever.....				15	3				16	34
Undulant fever.....				1	1			3		5
Veneral diseases:										
Gonorrhoea.....	6	12	19	111	135		48	56	100	487
Syphilis.....		11	5	91	65		16	4	43	240
Whooping cough.....		5	1	62	49	2		4		123

### JAMAICA

*Notifiable diseases—4 weeks ended August 24, 1946.*—For the 4 weeks ended August 24, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities
Cerebrospinal meningitis.....		1
Chickenpox.....	3	3
Diphtheria.....		3
Dysentery, unspecified.....	2	2
Erysipelas.....		6
Leprosy.....		6
Puerperal sepsis.....		2
Tuberculosis (pulmonary).....	33	58
Typhoid fever.....	6	97
Typhus fever (murine).....	6	1

## JAPAN

*Notifiable diseases—4 weeks ended July 27, 1946, and year to date.*—For the 4 weeks ended July 27, 1946, and for the year to date, cases of certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended July 27, 1946	Total cases reported for the year to date
Cholera.....	253	364
Diphtheria.....	2,312	29,956
Dysentery.....	11,691	16,748
Encephalitis, Japanese "B".....	33	158
Malaria.....	6,467	19,745
Meningitis, epidemic.....	83	1,011
Paratyphoid fever.....	1,083	4,491
Scarlet fever.....	136	1,173
Smallpox.....	114	17,606
Typhoid fever.....	4,000	25,736
Typhus fever.....	507	30,446

<sup>1</sup> For the period June 2, 1946 to date.

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*China.*—Cholera has been reported in China as follows: Anhwei Province—August 1–10, 1946, 711 cases, 28 deaths; Chekiang Province—August 1–10, 1946, 615 cases, 74 deaths; Kiangsu Province—July 21–31, 1946, 144 cases, 11 deaths; August 1–10, 1946, 101 cases, 11 deaths; August 11–20, 1946, 96 cases, 6 deaths reported in Nanking.

#### Plague

*Indochina (French).*—For the month of August 1946, 44 cases of plague were reported in French Indochina.

#### Smallpox

*Belgian Congo.*—During the week ended August 17, 1946, 885 cases of smallpox (alastrim) were reported in Belgian Congo.

#### Typhus Fever

*Greece.*—For the week ended September 7, 1946, 44 cases of typhus fever were reported in Greece.

*Indochina (French).*—For the month of August 1946, 50 cases of typhus fever were reported in French Indochina.

*Italy—Milan Province.*—Typhus fever has been reported in Milan Province, Italy, as follows: August 1–10, 1946, 103 cases; August 11–20, 1946, 140 cases.

#### Yellow Fever

*Peru—San Martin Department—Lamas.*—For the month of January 1946, 1 death from yellow fever (confirmed in May 1946) was reported in Lamas, San Martin Department, Peru.

FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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# Public Health Reports

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A Study of Rodent Ectoparasites in Mobile, Ala.  
Changes in Regulations for Tetraethyl Lead Gasoline



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# Public Health Reports

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## A STUDY OF RODENT ECTOPARASITES IN MOBILE, ALA.<sup>1</sup>

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*This report on the 1934 survey of rodent ectoparasites in Mobile, Ala., is the second intracommunity analysis of data collected in an extensive and simultaneous survey of several communities in the United States. This large project was under the general direction of A. S. Rumreich, Senior Surgeon, United States Public Health Service, who, in the first paper of this series has described in some detail the background for the investigation and has also analyzed certain intercommunity comparative data from the standpoint of correlations between ectoparasite indices and the incidence of endemic typhus in human populations (1, 2). The pressure of other duties has made it impossible for Dr. Rumreich to continue active work on the analysis of the data for other communities, and it has been carried out by those who worked with him. Since conditions in each locality differed, it has been impracticable to follow in every detail the pattern of the first (Jacksonville) paper, but the tables in this and subsequent studies are in substantially comparable form.*

More than 40 years of research on the epidemiology of bubonic plague provide a classical background of theory and methodology for the study of epidemic diseases which exist in a rodent reservoir and are transmitted to man by rodent ectoparasites (3, 4). Some of the conclusions reached by the plague workers are of very general epi-

<sup>1</sup> From the Division of Public Health Methods. Collection of the data locally was under the direction of F. M. Faget, Medical Director, United States Public Health Service, and identification of the ectoparasites was directed by M. O. Nolan, Associate Zoologist, United States Public Health Service.

demiologic importance. We may note especially the establishment of the axiom that infectibility of a community with plague is proportional to the abundance of the vector species and the conclusion that, although no less than 15 species of insects are capable of transmitting plague under experimental conditions, epidemics are predominantly attributable to a single species, the tropical rat flea *Xenopsylla cheopis* Rothschild (3).

Comparatively recently it was recognized that typhus fever exists in the United States in a rodent reservoir and in a form transmissible by rodent ectoparasites (5, 6, 7). In certain respects the epidemiologic parallel between endemic typhus fever and bubonic plague is striking. Both diseases show marked seasonal variations in incidence and marked affinity for certain types of premises. As with plague, endemic typhus fever has been shown to be transmitted experimentally among rodents by a variety of arthropods (8, 9, 10, 11, 12, 13, 14, 15, 16) but field studies have focused attention primarily on *X. cheopis* as a natural vector. Data from surveys of rodent ectoparasites in communities of the United States may have public health value in connection with the control of both diseases. An adequate accumulation of comparable survey data collected under divergent conditions may aid both in identifying the vector species of consequence under natural conditions and in devising accurate criteria for the evaluation of epidemic liability under specified conditions.

#### THE PORT OF MOBILE

Mobile is situated at the mouth of the Mobile River and at the head of Mobile Bay in southwestern Alabama at latitude 30° 41' N. and longitude 80° 02' W. It is the county seat of Mobile County and is the only seaport in Alabama. The greater city occupies an area of about 20 square miles on a flat sandy plain and lies at an altitude of approximately 100 feet above sea level. The estimated population in 1933 was 70,500 composed of 45,400 white persons and 25,100 persons of other races.

During the period of field operations the port of Mobile was touched by about 25 steamship lines operating to ports throughout the world. It was also a port for coastwise shipping largely from New Orleans and Pensacola and exchanged barge-borne commerce through the inland waterways of the Warrior River system with regions as far north as Birmingham. The city was an important terminal for 5 railroad trunk lines. The principal imports were sodium nitrate, fruit (particularly bananas) and coconuts, molasses, manganese, and manganese ore; the principal exports were raw cotton, logs, lumber, and iron and steel products. In the inland and coastwise shipping there was con-

siderable traffic in grain, coal, coke, petroleum products, cottonseed oil, fish, oysters, and sand and gravel.

#### CHRONOLOGY AND TECHNIQUES OF FIELD OPERATIONS

The trapping of rats was begun in Mobile on January 22, 1934, and ended on December 27, 1934, after 266 actual days of trapping. Operations were interrupted only twice for periods of more than 3 days—once for 12 days from March 23 to April 3 and once for 5 days from July 1 to July 5. Trapping was distributed sufficiently evenly throughout the year to permit statistical analysis of the data on the basis of 48 weeks rather than on a monthly basis, as was necessary in the first paper of this series (1). The summary tables in the text, however, have been compiled on a monthly basis to facilitate comparison with the data of the Jacksonville study.

The techniques practiced in these surveys for live-trapping of rats and removal and identification of the ectoparasites already have been described in the Jacksonville paper. In Mobile there was also in progress until July 1, 1934, a rodent-eradication program conducted by the same workers who were live-trapping rodents for the ectoparasite study. Previous workers have noted the possibility of rodent destruction raising ectoparasite counts by causing the ectoparasites to become concentrated on the surviving hosts. Thus there is apparently a possibility that the somewhat high indices obtained in Mobile for the early months of 1934 may be related to the destruction of 18,835 rodents in the city during the first 6 months of the year. A more detailed analysis of this question, however, does not support the assumption that such influence was significant in this case.<sup>2</sup>

The data from the rodent-eradication program probably give a more reliable indication of the relative abundance of the important species of rodents than do the data of the ectoparasite survey because the live traps are very selective in their action, particularly in a tendency not to capture the smaller forms such as mice. Table 1 compares the numbers of rodents of each species taken by the two means. *Rattus norvegicus* definitely appears to have been the predominant domestic rodent in Mobile, but the data from live-trapping greatly overestimate this predominance.

#### COMPOSITION OF MATERIAL

Of the 6,159 rats examined for ectoparasites in the field station, 36 had to be eliminated from consideration because of loss of the vials of ectoparasites. Although these 36 rats were all infested with ecto-

<sup>2</sup> This particular point and others concerning the validity of indices as indicators of population changes is discussed in detail in a forthcoming paper (17) dealing with the problems encountered in interpreting the data from ectoparasite surveys.

TABLE 1.—*Relative abundance of species of domestic rodents*

Species	Rodent eradication program		Taken alive in traps	
	Number	Percent	Number	Percent
<i>R. norvegicus</i> .....	11,565	62.49	5,906	94.88
<i>R. r. rattus</i> .....	123	.66	13	.21
<i>R. r. alexandrinus</i> .....	1,128	6.10	178	2.83
<i>Mus musculus</i> .....	5,691	30.75	131	2.08
Total.....	18,507	100.00	6,288	100.00

parasites, their elimination had an insignificant effect on the infestation rates and no compensatory adjustment has been made in the tables which are based on the remaining 6,123 rats.

Hosts of other than the genus *Rattus* were taken in too small numbers to warrant special analysis. These consisted of 131 mice, 45 squirrels, 68 wood rats (*Neotoma*), 4 rabbits, 2 muskrats, 1 field mouse (*Microtus*), 15 opossums, and 9 birds. All but four of the 157 fleas found on squirrels belonged to the species *Orchopeas wickhami* which was found on no other hosts and the wood rats were almost exclusive hosts for the flea *Rhopalopsyllus gwyni* and the mite *Atricholaelaps glasgowi*. Otherwise these miscellaneous animals were lightly infested with ectoparasites and they are of no apparent importance for the purposes of this study.

All of the fleas from the 6,123 live *Rattus* were identified at the National Institute of Health but only a sample consisting of every tenth rat was examined for mites and lice. The data on these orders are thus based on a sample of 612 rats. Table 2 shows the composition of the ectoparasite collection by species and also an estimate of the relative abundance in nature of the various species as judged from the mean numbers found per rat examined.

*X. cheopis* is seen to have been the predominant species of rodent ectoparasite, but the louse *Polyplax spinulosa* and the flea *Echidnophaga gallinacea*, both of which have been shown experimentally to be potential typhus vectors (13, 14, 15, 18), exhibited considerable abundance, as did the mites *Laelaps hawaiiensis* and *Echinolaelaps echidninus*, and the lice of the genus *Hoplopleura*. The vector potentialities of these latter forms have not been thoroughly investigated, but in the absence of conclusive evidence to the contrary every important species of rodent ectoparasite should be investigated for possible epidemiologic importance.

#### CONSIDERATIONS ON STATISTICAL CONSTANTS OF THE SPECIES-POPULATIONS OF ECTOPARASITES

The work of the Indian Plague Commission led to the conclusion that the intensity of plague epizootics among rats depends upon

TABLE 2.—*Species composition of the ectoparasite collection from 6,123 live Rattus*

Ectoparasite species	Number	Percent of order	Estimated relative <sup>1</sup> abundance in nature
<b>Fleas:</b>			
<i>Xenopsylla cheopis</i> .....	28,855	64.0	27.9
<i>Nosopsyllus fasciatus</i> .....	3,846	8.5	3.7
<i>Leptopsylla segnis</i> .....	4,081	9.0	4.0
<i>Echidnophaga gallinacea</i> .....	7,292	16.2	7.0
<i>Ctenocephalides felis</i> .....	992	2.2	1.0
<i>Rhopalosiphum gwyni</i> .....	25	.1	0
<i>Pulex irritans</i> .....	6	0	0
Total Siphonaptera.....	45,097	100.0	43.6
<b>Mites:</b>			
<i>Laelaps hawaiiensis</i> .....	1,727	66.6	16.7
<i>Echinolaelaps echidninus</i> .....	733	28.3	7.1
<i>Eulaelaps stabularis</i> .....	43	1.7	.4
<i>Liponyssus bacoti</i> .....	31	1.2	.3
<i>Atricholaelaps glasgowi</i> .....	10	.4	.1
Others.....	48	1.9	.5
Total Acarina.....	2,592	100.0	25.1
<b>Lice:</b>			
<i>Polyplax spinulosa</i> .....	1,996	61.6	19.3
<i>Hoplopleura</i> spp.....	1,238	38.2	12.0
Others.....	5	.2	0
Total Anoplura.....	3,239	100.0	31.3

<sup>1</sup> Percentage of total ectoparasites when based on the mean number per examined rat.<sup>2</sup> Numbers of Acarina and Anoplura are based on 612 live rats.

the size of the *X. cheopis* population and that the extent of human epidemics is dependent upon the intensity of the epizootics. This postulated relationship between epidemic intensity and vector prevalence has received strong empirical support from studies made of arthropod-borne diseases by many workers but there still remain many inadequately answered questions as to the best manner of estimating vector populations.

With respect to hubeonic plague and endemic typhus fever it is clear that the total number of rodent ectoparasites in a locality will vary with the numbers of ectoparasites found per rodent and with the number of rodents in the locality. The size of the rodent population is frequently ignored for practical purposes and the ectoparasite counts from a sample collection of rats are taken as indicative of the total ectoparasite population.

The most used "flea index" has been the mean number per rat of individuals of the species in question. Eskey (19) noted that this average might be affected strongly by a few rats harboring very large numbers of fleas and suggested that the percentage of rats infested might provide a better index of flea abundance. Several other workers have eliminated rats with very high counts from their calculations in an attempt to avoid drastic increases in the mean resulting from high counts. Rumreich and Wynn (1) have recently proposed an "index" giving reduced emphasis to high counts by limiting all



such counts to a particular value  $\bar{X}$  determined by fitting a curve to the frequency distribution.

All of the indices proposed to date possess theoretical limitations largely related to the fact that ectoparasites apparently are never distributed at random among the available hosts, but tend to occur in groups or to comprise "contagious" frequency distributions (17, 20). Samples from such distributions yield larger numbers, both of noninfested rats and of rats with very high counts than would be expected by chance from a random distribution and the adequacy of usual indices as measures of population changes is accordingly diminished. Until some one type of ectoparasite index has been definitely shown, through a repeatedly demonstrated close correlation with typhus incidence, to be entirely adequate for practical purposes, it appears advantageous to consider several different indices in analyzing survey data. Following the precedent established for the Jacksonville study three types of indices have been used in analyzing the Mobile data: The mean, the infestation rate, and the "index" (1).

In Mobile the values obtained for  $\bar{X}$ , used in computing the "index," were 40 in the case of *X. cheopis* and 31 in the case of *L. hawaiiensis*. Thus, in computing the "index" for *X. cheopis* any rat having over 40 *cheopis* is counted as having exactly 40. These are not, however, unique values because they depend upon the type and complexity of the curve chosen to fit the data and the criteria adopted for judging the goodness of fit.

#### VARIATIONS IN PARASITIZATION BY HOST SPECIES

In the Jacksonville study (1) the flea *E. gallinacea* was found to be significantly more associated with *R. norvegicus* than with *R. rattus*, while other species of ectoparasites did not exhibit significant association with either host species. Since 92.8 percent of the rats in Jacksonville were *R. norvegicus* all of the host species were lumped together for calculation of the biometric constants.

In Mobile 94.9 percent of the rats were *R. norvegicus* so, as in the earlier study, the genus *Rattus* has been considered in its entirety for the purposes of this analysis. However, the results of many earlier studies (3, 4) have indicated heavier parasitization of *R. norvegicus* than of other rats and this factor may have epidemiologic importance in any region where the various *Rattus* species do not occur in extremely disproportionate numbers.

By using the chi-square test and a fourfold table (21) to test significance, parasitization of *R. norvegicus* has been compared with that of *R. rattus* for each species of ectoparasite. Table 3 shows the only statistically significant results obtained. *E. gallinacea* was

TABLE 3.—*Significant parasitization differences between host species*

Hosts	Ectoparasites		P <sup>1</sup>
	<i>E. gallinacea</i>	<i>L. segnis</i>	
Infested <i>norvegicus</i> .....	514	787	0.006
Noninfested <i>norvegicus</i> .....	5,318	5,145	
Infested <i>rattus</i> .....	8	569	10 <sup>-7</sup>
Noninfested <i>rattus</i> .....	181	120	

<sup>1</sup> The symbol P expresses the probability of obtaining by chance, when the true difference is zero, a sample difference as great as or greater than that obtained. By convention any value of 0.05 or less is considered statistically significant.

<sup>2</sup> Numbers larger than would be expected due to chance.

again found to be significantly associated with *R. norvegicus*, and *L. segnis* was significantly associated with *R. rattus*.

#### SEASONAL VARIATIONS OF PARASITIZATION

Endemic typhus fever in the United States has long been known to be primarily a summer and autumn disease (2, 5, 6). Any rodent-ectoparasite species which is responsible for transmitting this disease from rats to man would accordingly be expected to show seasonal variations in prevalence somewhat similar to the seasonal variations in typhus case incidence.

Tables 4, 4A, 4B, and 4C make it evident that each of the common species of ectoparasites except *E. gallinacea* does exhibit some definite seasonal variation in abundance. This is more clearly brought out if we divide the year into a "hot-weather" period and a "cold-weather" period and compare parasitization levels for the two periods. In Mobile the 24 consecutive weeks beginning on May 13 and ending October 27 were characterized by mean maximum daily temperatures in excess of 80° F. (only 1 week fell below this level, which, incidentally, has been considered by plague investigators (4, 22) to represent a critical upper limit for the effective spread of plague by *X. cheopis*) while the other 24 weeks of the study (January 21 to May 12 and October 28 to December 22) had only 1 week with a mean maximum daily temperature as high as 80° F.

Table 5 compares parasitization levels for the two periods. Only *E. gallinacea* failed to vary significantly between the hot- and cold-weather periods while, as in the Jacksonville analysis, only *X. cheopis* and *L. hawaiiensis* exhibited warm-weather maxima such as one would expect to find for any species which commonly transmits endemic typhus to man. Unfortunately we have no data on the incidence of typhus infection among the rats so we cannot neglect the possibility that other ectoparasite species may be of primary importance in spreading this infection from rat to rat.

TABLE 4.—Monthly and annual means, indices, and infestations, *Siphonaptera* and *X. cheopis*, by principal host species

Month	Rodent host		Total Siphonaptera <sup>1</sup>			<i>Xenopsylla cheopis</i>			
	Species	Number	Number	Mean	Infestation percent	Number	Mean	Index	Infestation percent
<i>1934</i>									
January	<i>R. norvegicus</i>	273	2,875	10.53	91.6	1,298	4.75	4.32	72.5
	<i>R. rattus</i>	15	87	5.80	73.3	22	1.47	1.47	40.0
	Total	288	2,962	10.28	90.6	1,320	4.58	4.17	70.8
February	<i>R. norvegicus</i>	944	7,180	7.61	74.3	2,600	2.75	2.65	53.7
	<i>R. rattus</i>	56	387	6.91	85.7	85	1.52	1.38	33.9
	Total	1,000	7,567	7.57	74.9	2,685	2.68	2.58	52.6
March	<i>R. norvegicus</i>	860	6,836	7.95	69.1	2,302	2.68	2.50	50.7
	<i>R. rattus</i>	15	42	2.80	66.7	7	.47	.47	26.7
	Total	875	6,878	7.86	69.0	2,309	2.64	2.47	50.3
April	<i>R. norvegicus</i>	419	2,618	6.25	61.3	1,830	4.37	3.36	44.4
	<i>R. rattus</i>	3	2	.67	33.3	1	.33	.33	33.3
	Total	422	2,620	6.21	61.1	1,831	4.34	3.34	44.3
May	<i>R. norvegicus</i>	389	4,680	12.03	81.2	2,481	6.38	5.73	68.4
	<i>R. rattus</i>	20	33	1.65	60.0	19	.95	.95	35.0
	Total <sup>2</sup>	411	4,716	11.47	80.3	2,501	6.08	5.47	66.7
June	<i>R. norvegicus</i>	550	5,486	9.97	80.2	4,278	7.78	7.45	75.6
	<i>R. rattus</i>	30	136	4.53	83.3	118	3.93	3.93	83.3
	Total	580	5,622	9.69	80.3	4,396	7.58	7.27	76.0
July	<i>R. norvegicus</i>	287	2,563	9.60	79.8	2,534	9.49	8.79	79.0
	<i>R. rattus</i>	4	7	1.75	75.0	7	1.75	1.75	75.0
	Total	271	2,570	9.48	79.7	2,541	9.38	8.69	79.0
August	<i>R. norvegicus</i>	462	3,343	7.24	82.9	3,264	7.06	6.59	81.0
	<i>R. rattus</i>	11	30	2.73	72.7	29	2.64	2.64	72.7
	Total	473	3,373	7.13	82.7	3,293	6.96	6.50	80.8
September	<i>R. norvegicus</i>	493	2,280	4.62	79.5	2,176	4.41	4.27	77.5
	<i>R. rattus</i>	11	46	4.18	63.6	45	4.09	4.09	63.6
	Total	504	2,326	4.62	79.2	2,221	4.41	4.27	77.2
October	<i>R. norvegicus</i>	481	3,193	6.64	81.3	3,007	6.25	6.10	79.6
	<i>R. rattus</i>	11	19	1.73	54.5	17	1.55	1.55	54.5
	Total	492	3,212	6.53	80.7	3,024	6.15	6.00	79.1
November	<i>R. norvegicus</i>	445	2,068	4.65	69.4	1,797	4.04	3.98	66.1
	<i>R. rattus</i>	8	16	2.00	62.5	12	1.50	1.50	60.0
	Total	453	2,084	4.60	69.3	1,809	3.99	3.94	65.8
December	<i>R. norvegicus</i>	349	1,157	3.32	63.0	925	2.65	2.65	55.9
	<i>R. rattus</i>	5	10	2.00	60.0	0	0	0	0
	Total	354	1,167	3.30	63.0	925	2.61	2.61	55.1
Year	<i>R. norvegicus</i>	5,932	44,279	7.53	76.1	28,492	5.22	4.87	67.0
	<i>R. rattus</i>	189	815	3.06	65.9	362	1.68	1.67	47.3
	Total <sup>2</sup>	6,123	45,097	7.40	75.9	28,855	5.12	4.78	66.5

<sup>1</sup>Includes 25 *Rhopalosiphum gwyni* and 6 *Pulex irritans*.<sup>2</sup>Includes 2 *Rattus* of unknown species.

TABLE 4A.—Monthly and annual means and infestations, *N. fasciatus*, *L. segnis*, *E. gallinacea*, and *C. felis*, by principal host species

Month	Species of rodent host	<i>Nosopsyllus fasciatus</i>			<i>Leptopsylla segnis</i>			<i>Echidnophaga gallinacea</i>			<i>Ctenocephalides felis</i>		
		Number	Mean	Infestation per cent	Number	Mean	Infestation per cent	Number	Mean	Infestation per cent	Number	Mean	Infestation per cent
1934													
January	<i>R. norvegicus</i> .....	1	( <sup>1</sup> )	0.4	767	2.81	62.6	711	2.60	20.9	98	0.36	13.9
	<i>R. rattus</i> .....	0	0	0	65	4.33	73.3	0	0	0	0	0	0
	Total..	1	( <sup>1</sup> )	.3	832	2.89	63.2	711	2.47	19.8	98	.34	13.2
February	<i>R. norvegicus</i> .....	1,386	1.48	36.1	1,564	1.66	26.4	1,389	1.47	13.0	226	.24	12.2
	<i>R. rattus</i> .....	24	.43	28.6	247	4.41	64.3	26	.46	5.4	4	.07	3.6
	Total..	1,420	1.42	35.7	1,811	1.81	28.5	1,415	1.42	12.6	230	.23	11.7
March	<i>R. norvegicus</i> .....	1,689	1.98	41.5	870	1.01	16.7	1,687	1.96	14.4	272	.32	12.0
	<i>R. rattus</i> .....	10	.67	33.3	21	1.40	46.7	0	0	0	1	.07	6.7
	Total..	1,699	1.94	41.4	891	1.02	17.3	1,687	1.93	14.2	273	.31	11.9
April	<i>R. norvegicus</i> .....	227	.54	21.7	61	.15	8.8	420	1.00	9.5	77	.18	8.8
	<i>R. rattus</i> .....	0	0	0	1	.33	33.3	0	0	0	0	0	0
	Total..	227	.54	21.6	62	.15	9.0	420	1.00	9.5	77	.18	8.8
May	<i>R. norvegicus</i> .....	164	.42	17.7	178	.46	18.0	1,783	4.58	20.3	74	.19	10.0
	<i>R. rattus</i> .....	3	.15	15.0	5	.25	15.0	5	.25	10.0	1	.05	5.0
	Total <sup>2</sup> ..	169	.41	18.0	183	.45	17.8	1,788	4.35	19.7	75	.18	9.7
June	<i>R. norvegicus</i> .....	58	.11	6.7	117	.21	9.3	900	1.64	12.5	131	.24	10.9
	<i>R. rattus</i> .....	2	.07	6.7	13	.43	20.0	2	.07	6.7	1	.03	3.3
	Total..	60	.10	6.7	130	.22	9.8	902	1.56	12.2	132	.23	10.5
July	<i>R. norvegicus</i> .....	2	.01	.7	1	( <sup>1</sup> )	.4	18	.07	3.4	8	.03	3.0
	<i>R. rattus</i> .....	0	0	0	0	0	0	0	0	0	0	0	0
	Total..	2	.01	.7	1	( <sup>1</sup> )	.4	18	.07	3.3	8	.03	3.0
August	<i>R. norvegicus</i> .....	0	0	0	3	.01	.4	59	.13	4.8	17	.04	3.5
	<i>R. rattus</i> .....	0	0	0	0	0	0	0	0	0	1	.09	9.1
	Total..	0	0	0	3	.01	.4	59	.12	4.7	18	.04	3.6
September	<i>R. norvegicus</i> .....	23	.05	3.7	12	.02	1.4	58	.12	5.1	11	.02	1.4
	<i>R. rattus</i> .....	0	0	0	0	0	0	1	.09	9.1	0	0	0
	Total..	23	.05	3.6	12	.02	1.4	59	.12	5.2	11	.02	1.4
October	<i>R. norvegicus</i> .....	67	.12	8.1	28	.06	3.5	85	.18	4.4	16	.03	2.7
	<i>R. rattus</i> .....	1	.09	9.1	1	.09	9.1	0	0	0	0	0	0
	Total..	68	.12	8.1	29	.06	3.7	85	.17	4.3	16	.03	2.6
November	<i>R. norvegicus</i> .....	97	.22	10.8	88	.20	4.7	55	.12	3.8	31	.07	2.5
	<i>R. rattus</i> .....	1	.12	12.5	3	.38	12.5	0	0	0	0	0	0
	Total..	98	.22	10.8	91	.20	4.9	55	.12	3.8	31	.07	2.4
December	<i>R. norvegicus</i> .....	88	.25	14.6	27	.08	4.9	93	.27	8.0	23	.07	3.4
	<i>R. rattus</i> .....	1	.20	20.0	9	1.80	60.0	0	0	0	0	0	0
	Total..	89	.25	14.7	36	.10	5.6	93	.26	7.9	23	.06	3.4
Year..	<i>R. norvegicus</i> .....	3,802	.43	13.5	3,716	.56	13.1	7,258	1.18	10.0	984	.15	7.0
	<i>R. rattus</i> .....	42	.14	10.4	365	1.12	27.8	34	.07	2.6	8	.03	2.3
	Total <sup>2</sup> ..	3,846	.42	13.5	4,081	.58	13.5	7,292	1.13	9.8	992	.14	6.8

<sup>1</sup> Less than 0.005.<sup>2</sup> Includes 2 *Rattus* of unknown species.

TABLE 4B.—Monthly and annual means, indices, and infestations, *Acarina*, by combined host species *R. norvegicus*—*R. rattus*

Month	Number of live rats	Number of animals in 10-per cent sample	Total Acarina			<i>Laelaps hawaiiensis</i>			
			Number	Mean	Infestation percent	Number	Mean	Index	Infestation percent
1934									
January.....	288	28	47	1.68	35.7	5	0.18	0.18	14.3
February.....	1,000	100	196	1.96	43.0	32	.32	.32	10.0
March.....	875	88	205	2.33	38.4	41	.47	.47	13.8
April.....	422	42	281	6.21	66.7	140	3.33	3.33	42.9
May.....	411	41	254	6.20	56.1	171	4.17	4.17	39.0
June.....	580	58	390	6.72	50.0	216	3.72	3.40	27.6
July.....	271	27	53	1.90	29.6	47	1.74	1.74	18.5
August.....	473	47	227	4.83	55.3	199	4.23	3.45	46.8
September.....	504	51	303	5.94	64.7	256	5.02	4.80	56.9
October.....	492	49	386	7.88	57.1	378	7.71	5.49	55.1
November.....	453	45	235	5.22	55.6	218	4.84	3.71	51.1
December.....	354	36	35	.97	33.3	24	.67	.67	22.2
Year.....	6,123	612	2,592	4.33	48.6	1,727	3.03	2.64	33.2

Month	<i>Echinolaelaps echidninus</i>			<i>Liponyssus bacoti</i>			Other species <sup>1</sup>
	Number	Mean	Infestation percent	Number	Mean	Infestation percent	Number
<i>1934</i>							
January.....	32	1.14	21.4	9	0.32	10.7	1
February.....	115	1.15	30.0	5	.05	2.0	44
March.....	128	1.45	22.7	3	.03	2.3	33
April.....	111	2.64	52.4	0	0	0	10
May.....	78	1.90	29.3	1	.02	2.4	4
June.....	171	2.95	36.2	3	.05	5.2	0
July.....	5	.19	11.1	0	0	0	1
August.....	21	.45	21.3	3	.06	4.3	4
September.....	45	.88	21.6	0	0	0	2
October.....	7	.14	8.2	0	0	0	1
November.....	11	.24	8.9	6	.13	2.2	0
December.....	9	.25	8.3	1	.03	2.8	1
Year.....	733	1.12	22.6	31	.06	2.7	101

<sup>1</sup> Includes 43 *Eulaelaps stabularis*, 10 *Atricholaelaps glasgowi*, 6 *Uropodidae*, 4 *Myobia ensifera*, 4 *Macrocheles*, 1 *E. glasgowi*, and 33 unidentified.

TABLE 4C.—Monthly and annual means and infestations, *Anoplura*, by combined host species *R. norvegicus*—*R. rattus*

Month	Number of live rats	Number of animals in 10-per cent sample	Total Anoplura <sup>1</sup>			Polyplax spinulosa			Hoplopleura		
			Number	Mean	Infestation percent	Number	Mean	Infestation percent	Number	Mean	Infestation percent
1934											
January.....	288	28	61	2.18	50.0	55	1.96	39.3	6	0.21	10.7
February.....	1,000	100	1,193	11.93	65.0	627	6.27	51.0	566	5.66	43.0
March.....	875	88	792	9.00	71.6	639	6.12	59.1	253	2.88	36.4
April.....	422	42	181	4.31	59.5	164	3.90	57.1	17	.40	14.3
May.....	411	41	117	2.85	58.5	66	1.61	46.3	51	1.24	22.0
June.....	580	58	111	1.91	27.6	85	1.47	24.1	21	.36	6.9
July.....	271	27	17	.63	22.2	6	.22	14.8	11	.41	11.1
August.....	473	47	109	2.32	31.9	71	1.51	23.4	38	.81	14.9
September.....	504	51	84	1.65	33.3	50	.98	27.5	34	.67	11.8
October.....	492	49	163	3.33	40.8	63	1.29	32.7	100	2.04	14.3
November.....	453	45	372	8.27	31.1	240	5.33	31.1	132	2.93	8.9
December.....	354	36	39	1.08	36.1	30	.83	22.2	9	.25	16.7
Year.....	6,123	612	3,239	4.12	44.0	1,996	2.62	35.7	1,238	1.49	17.6

<sup>1</sup> Includes 5 unidentified *Anoplura* in June.

TABLE 5.—Seasonal differences in means, indices, and infestations, principal ectoparasite species, on hosts of the genus *Rattus*

Ectoparasite species	Biometric constant	Season of highest average values	Critical ratio (t) <sup>1</sup>	Probability of chance occurrence (P) <sup>2</sup>
<i>X. cheopis</i> .....	Mean.....	warm.....	6.83	0.000
	Index.....	do.....	7.78	.000
	Infestation.....	do.....	9.04	.000
<i>N. fuscatus</i> .....	Mean.....	cold.....	4.28	.000
	Index.....	do.....	5.98	.000
	Infestation.....	do.....	2.88	.004
<i>L. segnis</i> .....	Mean.....	do.....	2.73	.084
	Index.....	do.....	1.19	.805
	Infestation.....	warm.....	1.80	.072
<i>E. gallinacea</i> .....	Mean.....	cold.....	3.78	.000
	Index.....	do.....	3.60	.000
	Infestation.....	do.....	2.80	.005
<i>C. felis</i> .....	Mean.....	warm.....	3.11	.003
	Index.....	do.....	2.13	.033
	Infestation.....	do.....	2.65	.008
<i>P. spinulosa</i> .....	Mean.....	cold.....	3.66	.000
	Index.....	do.....		
	Infestation.....	do.....		

<sup>1</sup> The ratio of the differences between seasonal means to the standard error of this difference.<sup>2</sup> See footnote to table 3.

## RELATION OF ECTOPARASITE COUNTS TO METEOROLOGIC FACTORS

The early students of plague and typhus epidemiology noted sudden alterations in epidemic intensity coinciding with meteorologic phenomena and attempted to determine definite limits of temperature, rainfall, and atmospheric moisture which were favorable for epidemic propagation (23, 24, 25, 26, 27, 28). With the establishment of the flea-transmission theory of plague it came to be generally accepted that weather influences the course of epidemics through effects exerted on the flea population (29, 30, 31, 32, 33). Specifically, such effects might be exerted in a number of ways, viz, through effects on flea propagation and consequently on the size of the flea population (29, 30, 32, 34), through effects on the predilection of the fleas to bite (3, 4), through lethal effects on fleas separated from their hosts (33, 35, 36, 37, 38), and perhaps on the multiplication and survival of the pathogenic organisms in the fleas (3, 4). There are also definite indications that meteorologic conditions may influence the numbers of fleas actually on the hosts quite apart from any actual change in the total flea population (4, 38, 39).

That the ectoparasite counts actually respond to some widespread conditions, presumably meteorologic, is indicated by a considerable tendency for indices from different portions of the city and from different types of premises to fluctuate simultaneously (17). Tentative identification of particular influential meteorologic conditions may be made if the indices exhibit significant correlation with appropriate meteorologic data although the occurrence of such correlation is by itself insufficient to establish causation. The principal monthly meteorologic data for Mobile are shown in table 6. Table 7 shows the coefficients of correlation between the weekly biometric

TABLE 6.—*Meteorologic conditions in Mobile before and during the period of field operations*

Month	Contemporary measurement			Previous measurement		
	Mean temperature (degrees Fahrenheit)	Total precipitation (inches)	Mean relative humidity	Mean temperature (degrees Fahrenheit) 66-year average	Total precipitation (inches) 67-year average	Mean relative humidity 50-year average
<i>1934</i>						
January.....	55.2	4.31	75.5	52.0	4.86	80.0
February.....	51.3	4.90	73.0	54.4	5.16	78.0
March.....	57.8	5.93	79.0	60.2	6.40	78.0
April.....	66.9	6.43	78.5	66.8	4.90	78.5
May.....	74.0	5.63	78.5	74.0	4.42	78.5
June.....	81.1	4.14	78.0	80.2	5.33	77.0
July.....	82.2	6.06	80.0	81.8	6.94	80.0
August.....	81.6	7.59	83.0	81.4	6.61	81.5
September.....	77.2	.95	79.0	78.3	5.00	79.5
October.....	71.4	7.39	79.0	68.7	3.69	77.0
November.....	62.0	5.31	76.0	59.1	3.63	77.5
December.....	51.6	2.93	80.0	52.8	4.87	80.0
Year.....	67.7	61.57	78.3	67.5	61.81	78.5

TABLE 7.—*Values of coefficients of correlation between biometric constants and meteorologic factors*<sup>1</sup>

Ectoparasite species	Biometric constant	Meteorologic measurement <sup>2</sup>		
		Temperature	Rainfall	Humidity
<i>X. cheopis</i> .....	Mean.....	0.717±0.071**	0.053±0.145	-0.067±0.145
	Index.....	.739±.066**	.060±.145	-.039±.146
	Infestation.....	.668±.081**	.047±.146	.011±.146
<i>N. fuscatus</i> .....	Mean.....	-.548±.102**	.064±.145	-.074±.145
	Infestation.....	-.041±.086**	.118±.144	-.123±.144
	Mean.....	-.550±.102**	.024±.146	-.387±.124**
<i>L. segnis</i> .....	Infestation.....	-.480±.112**	.074±.145	-.280±.134
	Mean.....	-.091±.145	.184±.141	-.220±.139
	Infestation.....	-.243±.137	.024±.146	-.116±.144
<i>C. felis</i> .....	Mean.....	-.338±.120*	.012±.145	-.016±.146
	Infestation.....	-.286±.134	.018±.146	-.017±.146
	Mean.....	.385±.126**	-.109±.146	.182±.143
<i>L. hawaiiensis</i> .....	Index.....	.456±.117**	-.077±.147	.204±.141
	Infestation.....	.400±.124**	-.080±.147	.232±.140
	Mean.....	-.435±.120**	.017±.147	-.327±.132*
<i>P. spmuloosa</i> .....	Infestation.....	-.413±.122**	-.043±.147	.020±.147

<sup>1</sup> The correlation coefficients and their standard errors are shown. One asterisk, \* indicates that the correlation coefficient is; by Fisher's z-test, statistically significant— $P < 0.05$ . A double asterisk, \*\* indicates a highly significant value— $P < 0.01$ .

<sup>2</sup> 47 weekly values were used in all computations for this table.

constants for the ectoparasite species and weekly meteorologic data. The meteorologic data are from Weather Bureau records and, for temperature, they represent the means of the 14 daily maximum and minimum readings while the relative humidity data are the means of 14 readings made at 7 a. m. and 7 p. m. daily. The coefficients of correlation suggest that, except for *E. gallinacea* and *C. felis*, temperature exerted the greatest influence on the Mobile ectoparasite populations. It is noteworthy that, as in Jacksonville (1), only *X. cheopis* and *L. hawaiiensis* exhibited significant positive correlations with temperature.

Because the ectoparasite populations cannot respond instantaneously to altered environmental conditions it is reasonable to expect, if the changes in ectoparasite counts represent actual changes in ectoparasite abundance, that the biometric constants should give highest correlations with the meteorologic conditions prevailing some weeks previously. This has been investigated for the Mobile data and, in the case of *X. cheopis*, a time lag of 4 weeks does yield the maximum values for correlation with temperature. In no case, however, was this increase in the coefficient of correlation statistically significant.

#### LOCATIONAL FACTORS IN PARASITIZATION

The rats captured in Mobile were classified, as described in the Jacksonville study, according to section of the city (zone) in which they were trapped, type of premises on which they were trapped, and according to whether the trap was located inside of, or outside of, a building. The zone boundaries used in Mobile are shown on the map (fig. 1).

Tables 8 and 9 show how the biometric constants varied with respect to these criteria and tests for statistical significance of these differences are shown in table 10.

With respect to the classification of the city by zones, *X. cheopis* was significantly associated with the commercial zone while *E. gallinacea* was significantly associated with the residential zone. These results are in general agreement with those obtained in Jacksonville. However, *L. hawaiiensis*, which was significantly associated with the commercial zone in Jacksonville, failed to exhibit this association in Mobile.

In Jacksonville none of the ectoparasite species exhibited significant differences associated with the types of premises on which the rats were trapped. In Mobile *X. cheopis* was significantly associated with food-handling business establishments as opposed to residences, while *N. fasciatus*, *E. gallinacea*, and *C. felis* were most abundant in association with residences.

With respect to location of the trap, *X. cheopis* and *L. segnis* were significantly more abundant in Mobile on rats which were caught indoors. *L. hawaiiensis* also showed this tendency, but it was statistically significant only in the case of the mean.

#### DISCUSSION

The series of rodent-ectoparasite surveys of which the Mobile study is a part was inaugurated for the purpose of evaluating a portion of the complex of conditions which govern infectibility of a community with bubonic plague or endemic typhus fever. Definite identifica-



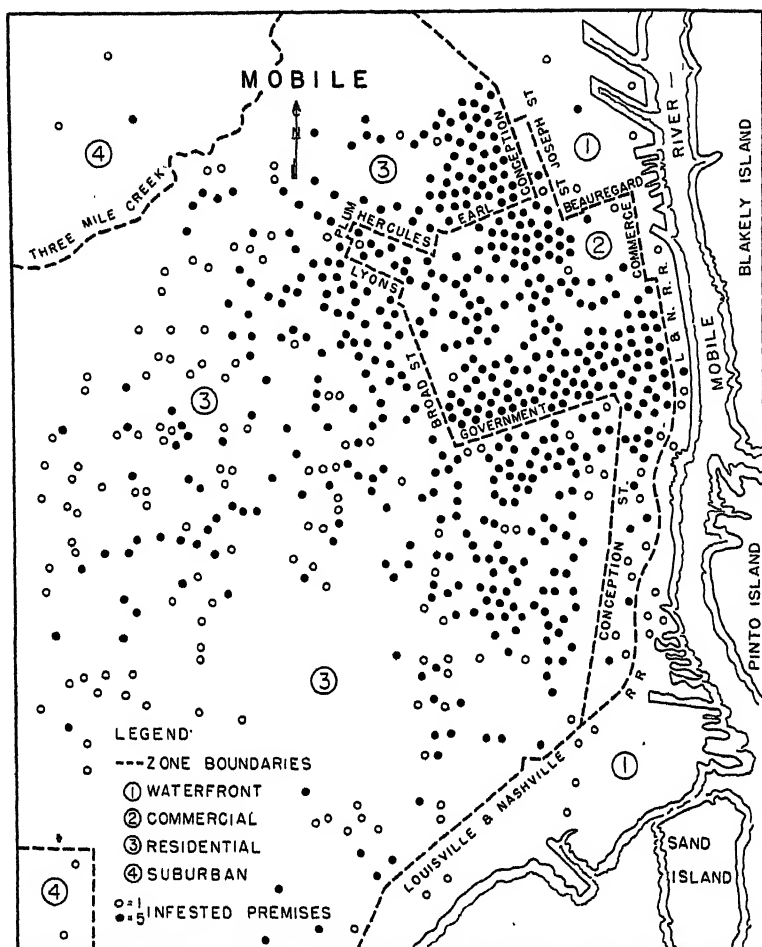


FIGURE 1.—Map of Mobile showing zone boundaries and locations of infested premises.

tion of the natural vectors of endemic typhus and knowledge of their ecological relationships should greatly facilitate estimation of community infectibility. Comparison of the results of numerous surveys conducted under varying conditions may also indicate to what extent conclusions reached from the data of one ectoparasite survey may be applicable to other places and times.

The principal rationale for the ectoparasite survey method is the very logical and fairly adequately verified assumption that, when arthropod-borne infection is present in a community, the probability of spread to man, and consequently the human incidence, tends to be proportional to the vector population of the community. Aside from complications introduced by such conditions as nonuniform exposure and susceptibility, a very close parallel between case incidence and vector prevalence should be anticipated.

TABLE 8.—*Annual means, indices, and infestations, X. cheopis, L. hawaiiensis and N. fasciatus by zone, trap location, and types of premises*<sup>1</sup>

	Number of live rats examined <sup>1</sup>	<i>Xenopsylla cheopis</i>				<i>Laelaps hawaiiensis</i>				<i>Nosopsyllus fasciatus</i>		
		Number	Mean	Index	Infestation per cent	Number in 10-per cent sample	Mean	Index	Infestation per cent	Number	Mean	Infestation per cent
Zone:												
Water-front.....	61	126	2.17	2.17	39.3	27	5.40	5.40	40.0	43	0.22	9.0
Commercial.....	2,692	15,743	6.42	5.96	72.0	773	4.44	3.29	37.8	1,282	.39	13.2
Residential.....	3,308	12,950	4.37	4.11	62.0	927	3.95	2.99	31.8	2,516	.44	14.5
Location of trap:												
Indoors.....	3,618	20,600	5.86	5.43	68.9	1,230	3.63	3.17	39.5	1,666	.41	13.3
Outdoors.....	2,600	8,208	4.04	3.89	63.2	497	3.13	2.65	32.3	2,175	.46	15.3
Type of premises:												
Food establishment.....	2,646	15,777	6.13	5.65	68.8	1,012	3.64	3.39	38.5	873	.29	11.0
Other business.....	413	2,163	4.38	4.26	68.2	53	1.39	1.39	36.6	258	.38	12.9
Residence.....	3,062	10,879	3.97	3.83	61.6	662	3.75	2.92	35.2	2,710	.51	16.7

<sup>1</sup> Omitted from tables 8 and 9 are: 2 rats from completely unknown locations having 36 *X. cheopis*, 5 *N. fasciatus*, and 1 *C. felis*; and 3 rats from unknown trap locations having 11 *X. cheopis*.

TABLE 9.—*Annual means and infestations, L. segnis, E. gallinacea, C. felis, and P. spinulosa by zone, trap location, and type of premises*<sup>1</sup>

	<i>Leptopsylla segnis</i>			<i>Echidnophaga gallinacea</i>			<i>Ctenocephalides felis</i>			<i>Polyplax spinulosa</i>		
	Number	Mean	Infestation per cent	Number	Mean	Infestation per cent	Number	Mean	Infestation per cent	Number in 10-per cent sample	Mean	Infestation per cent
Zone:												
Water front.....	103	0.86	13.8	2	0.06	6.2	2	0.02	1.0	22	3.50	60.0
Commercial.....	1,573	.56	11.9	1,751	.57	6.2	330	.11	5.6	738	2.95	30.2
Residential.....	2,405	.40	10.4	5,539	1.32	10.0	659	.14	7.0	1,236	2.03	36.9
Location of trap:												
Indoors.....	2,740	.66	11.9	4,152	1.07	8.0	529	.13	5.6	1,097	3.94	33.8
Outdoors.....	1,341	.32	9.7	3,140	1.29	11.0	462	.13	7.1	899	2.54	40.1
Premises:												
Food establishment.....	1,590	.56	11.2	2,705	1.07	8.0	193	.06	4.4	833	2.93	33.6
Other business.....	403	.55	11.1	70	.23	6.2	62	.10	6.8	76	2.83	34.1
Residence.....	2,088	.36	9.8	4,517	1.16	10.3	736	.17	7.4	1,087	2.27	36.1

The natural vectors of endemic typhus to man are not definitely known. Experimental transmission of the disease to man has apparently never been accomplished with any species of rodent ectoparasite although a number of species are known to be infectible by feeding on rodents and capable of transmitting the infection to rodents. Ecological results from field surveys can do much to indicate the probable vectors but, in the absence of knowledge that the incidence in rodents parallels the incidence in man, all numerically adequate species of rodent ectoparasites must be regarded as of possible epidemiologic importance.

It has been shown that in Mobile the prevalence, seasonal variations in abundance, and local distribution of *X. cheopis* are quite com-

TABLE 10.—Comparative scores<sup>1</sup> for zones, trap locations, and types of premises by numbers of weeks in which biometric constants from rats in one category exceeded those in the contrasting category<sup>2</sup>

Ectoparasite species	Biometric constant	Zones <sup>3</sup>				Trap locations				Uses			
		Commercial: water front		Residential: water front		Commercial: residential		Indoors: out-doors		Food establishments: businesses		Food establishments: residences	
		Score	P	Score	P	Score	P	Score	P	Score	P	Score	P
<i>X. cheopis</i> .....	Mean.....	13.4	0.049	12.5	0.143	34.13	0.003	38.8	0.000	26.14	0.031	41.6	0.000
	Index.....	13.4	.049	12.5	.143	35.12	.001	37.9	.000	26.15	.049	40.7	.000
	Infestation.....	13.4	.049	12.5	.143	31.16	.040	31.15	.026	26.12	1.000	36.12	.001
<i>N. fuscata</i> .....	Mean.....	11.2	0.022	13.2	.007	17.22	.622	17.22	.522	21.22	.121	11.25	.029
	Index.....	12.1	.003	13.2	.007	21.18	.749	18.21	.749	18.16	.864	12.24	.065
	Infestation.....	10.4	.180	12.4	.077	21.19	.874	31.9	.001	24.8	.007	23.16	.337
<i>L. segnis</i> .....	Mean.....	10.4	.180	12.4	.077	17.23	.430	30.10	.002	19.12	.281	23.17	.430
	Index.....	14.0	.000	16.0	.000	15.31	.026	22.24	.883	32.6	.000	14.32	.011
	Infestation.....	13.1	.002	15.1	.001	17.29	.104	17.29	.104	30.8	.000	15.31	.026
<i>E. gallinacea</i> .....	Mean.....	14.1	.001	14.1	.001	16.24	.263	18.22	.636	21.11	.110	5.33	.000
	Index.....	14.1	.001	14.1	.001	21.19	.874	14.26	.031	23.9	.020	8.31	.000
	Infestation.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
<i>C. felis</i> .....	Mean.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
	Index.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
	Infestation.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
<i>L. haemorrhoidalis</i> .....	Mean.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
	Index.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
	Infestation.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
<i>P. apinulosa</i> .....	Mean.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
	Index.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000
	Infestation.....	14.1	.001	14.1	.001	24.16	.208	23.14	.044	15.5	.041	26.17	.000

<sup>1</sup> The scores give the actual number of weeks in which a biometric constant for one category was larger than that of the contrasted category. For example, the mean number of *X. cheopis* per rat in the commercial zone exceeded the mean in the residential zone for 34 weeks out of 47, while the reverse was true for the other 13 weeks; the score was therefore 34/47. Any discrepancy this great, or greater, should occur by chance only about 3 times in 1,000 trials if the zones had equal *X. cheopis* populations.

<sup>2</sup> The P-values (see footnote to table 3) in this table are exact values computed as described in (40).

<sup>3</sup> The catch of rats in the water-front zone was too small to yield usable data for all species of ectoparasites.

patible with a role as vector of this disease. *L. hawaiiensis*, although less abundant and not known to attack man or to be infectible with typhus, also exhibits seasonal and local distributions which indicate that it should not be disregarded as a possible vector. All of the other ectoparasite species investigated, some of which are known to be potential vectors, appear on ecological and epidemiologic grounds unlikely to have been important vectors in Mobile. Similar conclusions were obtained from analysis of the Jacksonville survey (1) but there are indications that a somewhat different situation may prevail in Honolulu (2).

Three statistics, the mean, the infestation rate, and the "index" have been employed in this paper as estimates of ectoparasite abundance. Much more information on correlations with typhus incidence will be necessary before exclusive acceptance of any one type of estimate can be justified and all present methods have theoretical limitations. Presumably, when sufficient comparable data representing a variety of situations have been accumulated and analyzed it will be possible to identify measurable events transpiring in the ectoparasite populations with pending or threatening outbreaks of endemic typhus fever. Outbreaks of typhus among rodents would probably exhibit this relationship better than outbreaks of human cases and such data might profitably be collected in connection with future ectoparasite surveys.

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## CHANGES IN REGULATIONS PERTAINING TO TETRAETHYL LEAD GASOLINE <sup>1</sup>

In 1926 there were published, as part of Public Health Bulletin No. 163, which contained the report of the committee on tetraethyl lead gasoline, four sets of regulations which had been formulated in accordance with the committee's recommendations (1). These were proposed for adoption by the several States in order to secure uniformity of control, and were the subject of consideration at the meeting of the State and Territorial health authorities with the Surgeon General on May 25, 1926. The regulations were in four series, as follows:

- I. Proposed regulations for the manufacture of tetraethyl lead and the blending of the latter to make ethyl fluid.
- II. Proposed regulations for mixing.
- III. Proposed regulations for distribution of ethyl gasoline.
- IV. Proposed regulations for automobile garages, repair shops, service stations, and filling stations.

It was stated in the above-mentioned bulletin that the regulations thus published were based on the conditions and knowledge then existent, and that changes might be advisable from time to time.

The results of years of experience have fully justified the recommendations of the committee with respect to the foregoing measures of control. However, that regulation in series III which had to do with warning signs on the pumps left much to be desired in uniformity, effectiveness, and practicability, as motor fuels and equipment employed in dispensing them underwent change. Moreover, it appeared wise, in view of the general availability of gasoline containing tetraethyl lead, to call the attention of consumers, in the simplest and most striking manner, to the fact that such gasoline contains tetraethyl lead and that it is designed for use only as a motor fuel. By such means it was intended that motor fuel containing tetraethyl lead would come to be differentiated in the public mind from gasoline and other petroleum products adapted to other uses, and so would not be misused. In accordance with this viewpoint, the approval of the Surgeon General was given in November 1928, February 1933, March 1935, and June 1946, to certain changes in the wording and

<sup>1</sup> From Industrial Hygiene Division, Bureau of State Services.

the manner of employment of warning signs on gasoline pumps and other containers. These changes have resulted in the replacement of series III referred to above with the following regulations:

1. Each filling station shall keep prominently displayed on each pump which delivers motor fuel containing tetraethyl lead a sign or signs, composed of enameled metal or of material of equivalent durability, inscribed in prominent heavy gothic capital letters, black on white background, with one or the other of the following statements arranged as shown:

(a)  
CONTAINS LEAD  
(Tetraethyl) and is  
to be used as motor fuel  
only; not for cleaning or  
any other use. Avoid  
spilling.

(b)  
For use as a  
motor fuel only  
CONTAINS  
LEAD  
(Tetraethyl)

The printed matter on these signs, not counting the enclosing border, should measure approximately 7 inches wide by  $8\frac{1}{2}$  inches high in the case of (a) above, and 7 inches wide by 6 inches high in the case of (b). Such a sign shall be located on any side (front, back, or either lateral surface) of each pump, at such height (between 4 and 5 feet above ground level, when the design of the pump will permit), and in such position (free of intervening structures or equipment) as to be most easily observed. Island pumps will require a sign on front and back, or on both lateral surfaces, while pumps approached on but one side from either direction will require one sign on the front, or one on each lateral surface.

2. Containers of gasoline containing tetraethyl lead sold to customers shall bear one or the other of the following labels (as a sticker or decalcomania) in such a position as to be plainly legible when the container is opened:

(a)  
CONTAINS LEAD  
(Tetraethyl) and  
is to be used as  
motor fuel only.  
Not for cleaning or  
any other use.

(b)  
For use as a  
motor fuel only  
CONTAINS  
LEAD  
(Tetraethyl)

#### REFERENCE

- (1) Various authors: The use of tetraethyl lead gasoline in its relation to public health. Pub. Health Bull. No. 163. Government Printing Office, Washington 25, D. C., 1926.

*June 28, 1946*

**DEATHS DURING WEEK ENDED SEPT. 14, 1946**

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 14, 1946	Correspond- ing week, 1945
Data for 92 large cities of the United States:		
Total deaths.....	8,510	8,170
Average for 3 prior years.....	7,951	-----
Total deaths, first 37 weeks of year.....	334,441	330,466
Deaths under 1 year of age.....	685	613
Average for 3 prior years.....	595	-----
Deaths under 1 year of age, first 37 weeks of year.....	23,506	22,243
Data from industrial insurance companies:		
Policies in force.....	67,284,591	67,288,107
Number of death claims.....	10,577	11,226
Death claims per 1,000 policies in force, annual rate.....	8.2	8.7
Death claims per 1,000 policies, first 37 weeks of year, annual rate.....	9.7	10.3



# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 21, 1946

#### Summary

A definite decline in the incidence of poliomyelitis was recorded for the country as a whole. A total of 1,427 cases was reported, as compared with 1,623 last week and a 5-year (1941-45) median of 818. Decreases were recorded in all major geographic divisions except the South Central and Mountain. Of 35 States reporting more than 5 cases, 12 showed an increase (456 to 548), while 23 reported a decline (1,102 to 846). Those reporting increases are as follows (last week's figures in parentheses): Rhode Island 14 (4), New York 90 (87), Illinois 210 (193), Kansas 68 (64), Kentucky 12 (3), Alabama 18 (10), Oklahoma 15 (11), Texas 33 (28), Montana 13 (6), Idaho 7 (3), Utah 24 (7), Washington 44 (40).

A total of 17,201 cases has been reported for the year to date, as compared with 8,882 and 13,570, respectively, for the same periods of 1945 and 1944, and a 5-year median of 8,630. As compared with the corresponding period last year, a higher incidence has been reported in all areas except the New England and Middle Atlantic. As compared with the 1944 figures, larger numbers of cases have been reported in the East North Central area (1944 figures in parentheses) 3,725 (2,279), West North Central, 5,242 (712), West South Central, 1,650 (390), Mountain, 1,316 (158), and Pacific, 1,935 (544), while fewer cases have been reported in the New England, 395 (515), Middle Atlantic, 1,166 (5,868), South Atlantic, 964 (2,195), and East South Central, 814 (910).

Of 295 cases of diphtheria reported for the week, Kentucky reported 27 (last week 7), Texas 25 (last week 35), California 24 (last week 18), New York 18 (last week 24), and Alabama 18 (last week 12). The total for the year to date is 11,123 (as compared with 10,217 last year and a 5-year median of 8,926), of which Texas has reported 1,202, California, 828, New York 718, Ohio 651, Pennsylvania 539, Maryland 464, North Carolina 413, Illinois 398, Virginia 331, Indiana 325, and Michigan 316, aggregating 6,185 or about 56 percent of the total.

Deaths recorded for the week in 93 large cities of the United States totaled 8,248, as compared with 8,607 last week, 8,205 and 8,027, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,206. The cumulative total is 345,835, as compared with 341,548 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Sept. 21, 1946, and comparison with corresponding week of 1945 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Me- dian 1941- 45	Week ended—		Me- dian 1941- 45	Week ended—		Me- dian 1941- 45	Week ended—		Me- dian 1941- 45
	Sept. 21, 1946	Sept. 22, 1945		Sept. 21, 1946	Sept. 22, 1945		Sept. 21, 1946	Sept. 22, 1945		Sept. 21, 1946	Sept. 22, 1945	
NEW ENGLAND												
Maine.....	1	2	0	-----	1	-----	2	1	3	3	0	1
New Hampshire.....	0	0	0	-----	-----	-----	-----	-----	-----	0	0	0
Vermont.....	4	2	0	-----	-----	-----	5	-----	2	0	0	0
Massachusetts.....	9	4	4	-----	-----	-----	44	41	31	5	2	3
Rhode Island.....	2	0	0	-----	15	-----	2	1	1	0	0	0
Connecticut.....	1	0	1	-----	-----	1	7	-----	6	0	0	0
MIDDLE ATLANTIC												
New York.....	18	11	10	12	12	12	75	11	30	5	14	13
New Jersey.....	0	4	3	0	-----	1	10	6	26	3	5	5
Pennsylvania.....	9	5	5	1	2	-----	42	32	32	5	3	4
EAST NORTH CENTRAL												
Ohio.....	12	6	6	2	2	3	34	14	14	2	4	3
Indiana.....	5	9	9	14	2	4	4	2	3	4	4	1
Illinois.....	6	1	6	1	-----	2	14	32	19	6	2	2
Michigan.....	2	20	3	1	1	1	22	35	22	3	1	2
Wisconsin.....	6	2	0	4	12	12	23	20	25	1	0	0
WEST NORTH CENTRAL												
Minnesota.....	4	4	4	-----	-----	-----	2	5	5	0	2	2
Iowa.....	0	0	4	-----	-----	-----	5	4	4	2	0	0
Missouri.....	5	4	4	2	2	1	2	3	5	1	5	3
North Dakota.....	0	2	2	5	-----	-----	6	-----	1	0	0	0
South Dakota.....	3	1	4	-----	-----	-----	-----	2	-----	0	0	0
Nebraska.....	1	2	3	5	3	3	-----	2	2	0	0	0
Kansas.....	5	7	3	-----	-----	1	1	3	3	1	1	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	-----	-----	-----	-----	-----	-----	0	0	0
Maryland.....	11	8	4	2	1	1	6	2	7	1	2	2
District of Columbia.....	0	0	0	-----	-----	-----	4	-----	1	0	1	1
Virginia.....	9	20	16	161	97	63	15	4	4	3	1	2
West Virginia.....	5	10	6	-----	-----	1	-----	-----	2	1	5	2
North Carolina.....	11	50	47	-----	-----	-----	8	2	4	1	2	1
South Carolina.....	3	26	26	14	101	113	-----	6	6	0	0	0
Georgia.....	15	31	31	-----	11	7	9	1	5	0	3	0
Florida.....	7	6	6	1	-----	2	2	1	2	3	1	1
EAST SOUTH CENTRAL												
Kentucky.....	27	9	11	-----	1	1	43	9	4	3	0	0
Tennessee.....	10	39	15	2	6	12	3	3	3	2	3	1
Alabama.....	18	34	20	31	12	12	5	-----	4	0	1	1
Mississippi.....	6	25	15	-----	-----	-----	-----	-----	-----	0	1	1
WEST SOUTH CENTRAL												
Arkansas.....	4	6	6	12	-----	9	2	5	2	1	1	0
Louisiana.....	6	9	9	-----	34	1	-----	4	4	1	1	1
Oklahoma.....	3	2	8	5	21	17	2	-----	2	0	1	1
Texas.....	25	53	36	454	492	363	49	30	21	4	4	4
MOUNTAIN												
Montana.....	0	4	5	-----	2	2	10	18	3	0	0	0
Idaho.....	0	1	0	2	1	-----	7	17	4	0	0	0
Wyoming.....	2	0	0	-----	-----	3	-----	2	2	0	0	0
Colorado.....	6	4	4	-----	8	23	4	2	5	1	0	0
New Mexico.....	1	7	1	3	1	-----	2	-----	1	0	0	0
Arizona.....	1	5	1	25	4	23	3	3	3	0	1	1
Utah.....	0	1	0	-----	-----	-----	2	3	5	1	0	0
Nevada.....	0	0	0	-----	-----	-----	-----	1	-----	0	0	0
PACIFIC												
Washington.....	6	8	5	-----	-----	1	8	49	14	1	1	1
Oregon.....	2	0	1	-----	-----	2	17	16	18	0	0	0
California.....	24	18	13	2	13	13	38	143	51	5	11	11
Total.....	295	467	385	757	847	746	539	540	540	69	83	83
38 weeks.....	11, 123	10, 217	8, 926	194, 853	75, 069	84, 920	641, 654	104, 123	541, 618	4, 735	6, 578	6, 578

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

*Telegraphic morbidity reports from State health officers for the week ended Sept. 21, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.*

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Sept. 21, 1946	Sept. 22, 1945		Sept. 21, 1946	Sept. 22, 1945		Sept. 21, 1946	Sept. 22, 1945		Sept. 21, 1946	Sept. 22, 1945	
	1946	1945		1946	1945		1946	1945		1946	1945	
<b>NEW ENGLAND</b>												
Maine.....	0	9	2	23	12	10	0	0	0	0	0	0
New Hampshire.....	9	1	2	2	0	0	0	0	0	0	0	0
Vermont.....	2	6	4	1	2	2	0	0	0	0	0	0
Massachusetts.....	16	51	29	28	44	68	0	0	0	9	3	4
Rhode Island.....	14	1	1	2	5	4	0	0	0	0	0	0
Connecticut.....	1	11	11	8	7	9	0	0	0	0	1	1
<b>MIDDLE ATLANTIC</b>												
New York.....	90	110	110	75	82	82	0	0	0	7	4	8
New Jersey.....	9	55	27	15	15	19	0	0	0	3	2	2
Pennsylvania.....	14	48	48	48	76	72	0	0	0	5	5	9
<b>EAST NORTH CENTRAL</b>												
Ohio.....	46	37	34	60	95	79	0	0	0	3	4	8
Indiana.....	22	11	11	25	28	28	4	0	0	1	5	5
Illinois.....	210	93	50	34	62	62	0	0	0	3	5	5
Michigan <sup>1</sup> .....	69	12	20	43	40	49	0	0	0	2	3	4
Wisconsin.....	94	48	22	28	24	49	0	0	0	1	1	1
<b>WEST NORTH CENTRAL</b>												
Minnesota.....	128	23	23	13	26	26	0	0	0	0	1	1
Iowa.....	31	14	13	9	21	21	0	0	0	0	0	2
Missouri.....	72	9	9	3	22	22	0	0	0	1	1	6
North Dakota.....	30	0	1	1	6	4	0	0	0	1	0	0
South Dakota.....	9	1	1	1	0	9	0	0	0	1	0	0
Nebraska.....	33	14	10	22	16	7	0	0	0	11	2	0
Kansas.....	68	8	8	18	35	37	0	0	0	2	7	1
<b>SOUTH ATLANTIC</b>												
Delaware.....	4	2	2	2	2	1	0	0	0	0	0	0
Maryland <sup>2</sup> .....	2	13	13	5	22	14	0	0	0	1	5	4
District of Columbia.....	2	7	2	2	9	6	0	0	0	0	1	1
Virginia.....	6	19	4	32	32	32	0	0	0	4	7	7
West Virginia.....	2	3	3	27	42	42	0	0	0	1	1	6
North Carolina.....	3	14	8	17	48	48	0	0	0	2	2	4
South Carolina.....	0	6	2	0	22	6	0	0	0	0	4	5
Georgia.....	4	6	3	9	11	19	0	0	0	5	6	6
Florida.....	15	12	2	2	6	4	0	0	0	4	6	1
<b>EAST SOUTH CENTRAL</b>												
Kentucky.....	12	3	5	32	32	19	0	1	0	0	7	9
Tennessee.....	5	21	12	13	47	44	0	0	0	4	18	11
Alabama.....	18	4	3	9	18	18	0	0	0	0	3	4
Mississippi <sup>3</sup> .....	3	5	5	12	12	3	0	0	0	7	3	5
<b>WEST SOUTH CENTRAL</b>												
Arkansas.....	13	2	2	5	15	7	0	0	0	1	3	7
Louisiana.....	20	10	4	7	12	4	0	0	0	10	4	9
Oklahoma.....	15	15	3	8	8	6	0	0	0	1	5	5
Texas.....	38	39	5	22	56	20	1	0	0	10	17	17
<b>MOUNTAIN</b>												
Montana.....	13	7	2	2	6	5	0	0	0	0	5	0
Idaho.....	7	2	0	3	6	5	0	0	0	2	0	0
Wyoming.....	9	3	0	0	9	4	0	0	0	0	0	0
Colorado.....	49	11	4	5	7	10	1	0	0	0	5	5
New Mexico.....	14	1	1	4	7	3	0	0	0	2	8	4
Arizona.....	5	0	2	5	5	3	0	0	0	3	0	0
Utah <sup>1</sup> .....	24	22	2	4	3	4	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
<b>PACIFIC</b>												
Washington.....	44	20	5	12	0	19	0	0	0	0	2	2
Oregon.....	14	2	12	8	14	14	0	1	0	2	0	0
California.....	124	54	10	59	108	79	0	0	0	5	11	4
Total.....	1,427	864	818	765	1,177	1,128	6	2	5	114	167	176
88 weeks.....	17,201	8,882	8,680	89,992	139,374	102,603	292	279	625	3,114	8,671	4,184

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 8; New York 2; New Jersey 1; Ohio 1; North Carolina 1; Georgia 2; Florida 1; New Mexico 1; Oregon 1.

<sup>3</sup> Corrections: Pollomyelitis, Georgia, week ended September 7, 7 cases (instead of 8); week ended September 14, Nebraska 37 cases (instead of 38), Arkansas 17 cases (instead of 19); Maryland, delayed report, 1 case.

Telegraphic morbidity reports from State health officers for the week ended Sept. 21, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Sept. 21, 1946								
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever- epidemic	Undulant fever	
	Sept. 21, 1946	Sept. 22, 1945		Ame- bic	Bacil- lary	Un- speci- fied						
NEW ENGLAND												
Maine.....	-----	-----	39	14	-----	-----	-----	-----	-----	-----	-----	1
New Hampshire.....	-----	-----	-----	2	-----	-----	-----	-----	-----	-----	-----	-----
Vermont.....	7	11	17	-----	-----	-----	-----	-----	-----	-----	-----	1
Massachusetts.....	121	138	123	1	-----	-----	-----	-----	-----	-----	-----	-----
Rhode Island.....	18	18	32	-----	-----	-----	-----	-----	-----	-----	-----	1
Connecticut.....	39	34	34	1	-----	-----	-----	-----	-----	-----	-----	-----
MIDDLE ATLANTIC												
New York.....	146	286	286	4	4	-----	1	-----	-----	-----	-----	9
New Jersey.....	164	151	151	-----	1	1	1	1	-----	-----	-----	-----
Pennsylvania.....	113	191	191	1	-----	-----	-----	-----	-----	-----	-----	3
EAST NORTH CENTRAL												
Ohio.....	73	153	178	-----	1	-----	-----	-----	-----	-----	-----	9
Indiana.....	22	20	18	1	-----	-----	5	-----	-----	-----	-----	5
Illinois.....	145	79	146	5	-----	-----	-----	1	-----	-----	-----	6
Michigan <sup>1</sup> .....	189	179	191	1	-----	-----	-----	-----	-----	-----	-----	2
Wisconsin.....	245	47	199	-----	-----	-----	-----	-----	-----	-----	-----	9
WEST NORTH CENTRAL												
Minnesota.....	8	28	40	2	-----	-----	-----	-----	-----	-----	-----	2
Iowa.....	11	3	16	1	-----	-----	1	-----	1	-----	-----	2
Missouri.....	14	21	12	-----	-----	-----	-----	-----	1	-----	-----	4
North Dakota.....	-----	-----	10	-----	-----	-----	-----	-----	-----	-----	-----	-----
South Dakota.....	2	1	3	-----	-----	-----	-----	-----	-----	-----	-----	4
Nebraska.....	4	1	3	-----	-----	-----	-----	-----	-----	-----	-----	-----
Kansas.....	20	20	20	-----	-----	-----	-----	-----	-----	-----	-----	2
SOUTH ATLANTIC												
Delaware.....	3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Maryland <sup>1</sup> .....	40	87	69	-----	-----	-----	-----	-----	-----	-----	-----	-----
District of Columbia.....	7	7	13	-----	-----	-----	70	-----	-----	-----	-----	1
Virginia.....	25	18	27	-----	-----	-----	-----	-----	1	-----	-----	2
West Virginia.....	18	3	6	-----	-----	-----	-----	-----	-----	-----	-----	2
North Carolina.....	36	77	77	-----	1	-----	-----	-----	-----	-----	-----	-----
South Carolina.....	3	49	49	-----	1	-----	-----	-----	-----	-----	-----	-----
Georgia.....	10	16	16	1	2	-----	-----	-----	-----	14	6	-----
Florida.....	10	4	13	1	1	2	-----	-----	-----	16	4	-----
EAST SOUTH CENTRAL												
Kentucky.....	35	81	58	-----	-----	-----	-----	-----	-----	-----	1	1
Tennessee.....	12	20	32	-----	-----	1	-----	-----	2	-----	-----	-----
Alabama.....	5	2	14	-----	-----	-----	-----	2	-----	14	-----	-----
Mississippi <sup>2</sup> .....	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	-----	1
WEST SOUTH CENTRAL												
Arkansas.....	5	6	10	1	-----	-----	-----	-----	1	6	-----	-----
Louisiana.....	8	28	1	2	1	-----	-----	-----	-----	6	-----	-----
Oklahoma.....	6	14	7	-----	-----	-----	-----	3	1	-----	-----	1
Texas.....	189	127	108	10	170	25	1	-----	2	48	27	-----
MOUNTAIN												
Montana.....	4	8	23	-----	-----	-----	-----	-----	-----	1	-----	-----
Idaho.....	8	11	2	-----	-----	-----	-----	-----	-----	-----	-----	2
Wyoming.....	6	2	6	-----	-----	-----	-----	-----	-----	-----	-----	1
Colorado.....	13	32	35	1	-----	-----	-----	-----	-----	-----	-----	-----
New Mexico.....	8	11	9	-----	5	11	-----	-----	-----	-----	-----	-----
Arizona.....	6	17	15	-----	-----	28	-----	-----	-----	-----	1	-----
Utah <sup>1</sup> .....	3	12	21	-----	-----	-----	-----	-----	2	-----	-----	-----
Nevada.....	1	-----	-----	-----	-----	-----	1	-----	-----	-----	-----	-----
PACIFIC												
Washington.....	21	16	17	-----	-----	-----	-----	-----	-----	-----	-----	-----
Oregon.....	7	13	18	-----	-----	-----	-----	-----	-----	-----	-----	-----
California.....	62	187	170	4	18	-----	2	-----	2	-----	-----	10
Total.....	1,862	2,217	2,634	37	199	138	17	3	13	110	118	-----
Same week, 1945.....	2,217	-----	-----	30	842	397	31	6	12	182	87	-----
Average, 1943-45.....	2,196	-----	-----	35	613	311	22	6	11	150	-----	-----
38 weeks: 1946.....	74,147	-----	-----	2,099	12,363	5,070	480	515	697	2,588	3,764	-----
1945.....	95,886	-----	-----	1,383	19,610	8,342	455	420	576	3,508	3,521	-----
Average, 1943-45.....	104,266	-----	136,936	1,413	16,227	7,011	495	427	554	2,946	-----	-----

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

Leprosy: Texas 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 14, 1946

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	-----	0	1	0	1	0	0	-----
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	0	1	0	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Massachusetts:												
Boston.....	3	0	-----	1	2	0	4	14	11	0	0	24
Fall River.....	0	0	-----	0	-----	0	0	0	1	0	0	2
Springfield.....	0	0	-----	0	1	0	1	0	2	0	0	8
Worcester.....	0	0	-----	0	1	0	7	5	0	0	0	26
Rhode Island:												
Providence.....	0	0	-----	0	3	1	0	1	0	0	0	45
Connecticut:												
Bridgeport.....	0	0	-----	0	-----	0	0	0	1	0	1	-----
Hartford.....	0	0	-----	0	-----	0	1	1	1	0	0	2
New Haven.....	0	0	-----	0	1	0	1	0	0	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo.....	2	0	-----	0	-----	0	2	0	1	0	0	6
New York.....	19	0	4	0	25	1	42	54	20	0	4	49
Rochester.....	0	0	-----	0	-----	0	0	1	3	0	0	-----
Syracuse.....	0	0	-----	0	-----	0	1	3	5	0	0	1
New Jersey:												
Camden.....	0	0	-----	0	1	0	1	0	1	0	0	3
Newark.....	0	0	2	0	-----	0	0	3	4	0	0	28
Trenton.....	0	0	-----	0	-----	0	0	0	0	0	0	1
Pennsylvania:												
Philadelphia.....	6	0	-----	0	6	1	16	3	15	0	2	35
Pittsburgh.....	0	0	1	1	5	2	10	2	4	0	0	8
Reading.....	0	0	-----	0	1	0	1	0	0	0	0	10
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0	1	0	3	1	1	3	3	0	0	5
Cleveland.....	0	0	-----	0	21	0	3	24	4	0	1	20
Columbus.....	2	0	1	1	-----	1	0	2	8	0	0	6
Indiana:												
Fort Wayne.....	0	0	-----	0	-----	0	0	0	0	0	0	2
Indianapolis.....	0	1	-----	0	-----	1	1	7	2	0	0	6
South Bend.....	1	0	-----	0	-----	0	0	0	1	0	0	1
Terre Haute.....	0	0	-----	0	-----	0	0	1	1	0	0	-----
Illinois:												
Chicago.....	0	0	1	0	10	3	15	53	15	0	0	89
Springfield.....	0	0	-----	0	-----	0	3	5	1	0	0	2
Michigan:												
Detroit.....	4	1	-----	0	4	0	7	15	5	0	0	83
Flint.....	0	0	-----	0	-----	0	1	0	1	0	0	5
Grand Rapids.....	0	0	-----	0	1	0	0	3	2	0	0	6
Wisconsin:												
Kenosha.....	0	0	-----	0	-----	0	0	7	2	0	0	2
Milwaukee.....	0	0	-----	0	2	0	1	10	9	0	0	132
Racine.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Superior.....	2	0	-----	0	-----	0	0	3	0	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	1	0	-----	0	-----	0	0	14	1	0	0	2
Minneapolis.....	0	0	-----	0	-----	0	6	30	3	0	0	1
St. Paul.....	0	0	-----	0	-----	0	5	10	2	0	0	7
Missouri:												
Kansas City.....	0	0	-----	0	1	0	4	14	3	0	0	2
St. Joseph.....	0	0	-----	0	-----	0	0	1	0	0	0	-----
St. Louis.....	1	0	1	0	-----	0	10	36	3	0	0	15

## City reports for week ended Sept. 14, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	-----	0	-----	0	0	18	0	0	0	-----
Nebraska:												
Omaha.....	1	0	-----	0	-----	0	0	22	0	0	0	-----
Kansas:												
Topeka.....	0	0	-----	0	-----	1	0	2	1	0	0	4
Wichita.....	0	0	-----	0	-----	0	0	4	0	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	-----	2	0	3	0	2	0	-----
Maryland:												
Baltimore.....	5	0	1	1	6	0	7	1	4	0	0	35
Cumberland.....	0	0	-----	0	-----	1	0	0	0	0	0	-----
Frederick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0	-----	0	-----	5	0	3	0	2	0	2
Virginia:												
Lynchburg.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Richmond.....	0	0	-----	0	-----	0	3	0	1	0	0	6
Roanoke.....	3	0	-----	0	-----	0	0	0	0	0	0	-----
West Virginia:												
Charleston.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Wheeling.....	0	0	-----	0	-----	0	0	0	1	0	0	3
North Carolina:												
Wilmington.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Winston-Salem.....	0	0	-----	0	-----	0	0	0	6	0	0	3
South Carolina:												
Charleston.....	0	0	-----	0	-----	2	0	0	1	0	0	1
Georgia:												
Atlanta.....	5	0	-----	0	-----	0	0	2	2	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Savannah.....	0	0	-----	0	-----	1	0	0	0	0	0	-----
Florida:												
Tampa.....	4	0	-----	0	-----	0	2	0	0	0	1	-----
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	-----	0	-----	0	3	1	2	0	0	3
Nashville.....	0	0	-----	0	-----	0	3	1	0	0	0	3
Alabama:												
Birmingham.....	2	0	2	0	2	0	2	6	0	0	0	-----
Mobile.....	0	0	-----	0	-----	1	4	0	0	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	-----	1	0	1	0	0	0	2
Louisiana:												
New Orleans.....	1	0	2	0	1	0	4	4	3	0	0	-----
Shreveport.....	0	0	-----	0	-----	0	2	2	0	0	1	-----
Texas:												
Dallas.....	3	0	-----	0	-----	1	0	1	2	4	0	14
Galveston.....	1	0	-----	0	-----	0	0	0	0	0	0	1
Houston.....	2	0	-----	0	-----	0	2	1	1	0	0	-----
San Antonio.....	1	0	-----	0	-----	1	0	4	0	0	0	2
MOUNTAIN												
Montana:												
Billings.....	0	1	-----	0	-----	0	1	0	0	0	0	-----
Great Falls.....	1	0	-----	0	-----	3	1	0	1	0	0	-----
Helena.....	0	0	-----	0	-----	0	0	1	1	0	0	-----
Missoula.....	0	0	-----	0	-----	0	1	1	0	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	-----	0	0	0	6	0	0	3
Colorado:												
Denver.....	0	0	3	0	-----	0	1	27	5	0	1	3
Pueblo.....	1	0	-----	0	-----	0	0	4	0	0	0	-----
Utah:												
Salt Lake City.....	0	0	-----	0	-----	1	0	3	0	0	0	-----

## City reports for week ended Sept. 14, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	3	0	---	0	---	0	2	4	1	0	0	4
Spokane.....	0	0	---	0	---	1	1	18	0	0	0	2
Tacoma.....	0	0	---	0	---	0	0	0	1	0	0	---
California:												
Los Angeles.....	3	0	1	0	3	1	0	47	17	0	0	16
Sacramento.....	0	0	---	0	---	0	2	0	0	0	0	---
San Francisco.....	0	0	1	0	1	0	5	0	7	0	0	2
Total.....	78	3	21	4	120	15	204	496	205	0	11	751
Corresponding week, 1945.	48	---	16	6	173	---	240	---	221	0	17	823
Average, 1941-45.....	54	---	30	18	142	---	1225	---	262	0	31	877

<sup>1</sup> 3-year average, 1943-45.

<sup>2</sup> 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: New York 1; Chicago 1; San Francisco 1.

*Dysentery, bacillary.*—Cases: New York 2; Columbus 1; Chicago 1; Baltimore 1; Charleston, S. C., 3; Los Angeles 1.

*Dysentery, unspecified.*—Cases: San Antonio 2.

*Leprosy.*—Cases: New York 1.

*Typhemia.*—Cases: St. Louis 1.

*Typhus fever, endemic.*—Cases: New York 2; Charleston, S. C., 1; Tampa 4; Birmingham 1; Little Rock 1; New Orleans 4; Dallas 1; Houston 3; San Antonio 1; Los Angeles 2.

*Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1945, 34,351,200)*

	Diphtheria case rates	Etiophallitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polymyositis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	7.8	0.0	0.0	2.6	21	2.6	39.2	57.5	44	0.0	2.6	290
Middle Atlantic.....	12.5	0.0	3.2	0.5	18	1.9	33.8	30.5	25	0.0	2.8	65
East North Central.....	6.1	1.2	1.8	0.6	25	3.6	19.5	80.9	33	0.0	0.6	220
West North Central.....	6.0	0.0	2.0	0.0	4	0.0	51.7	300.4	26	0.0	0.0	66
South Atlantic.....	23.2	0.0	1.7	1.7	28	0.0	31.5	5.0	31	0.0	1.7	83
East South Central.....	11.8	0.0	11.8	0.0	12	5.9	70.8	47.2	12	0.0	0.0	35
West South Central.....	23.0	0.0	5.7	0.0	11	0.0	40.2	25.8	23	0.0	2.9	55
Mountain.....	15.9	7.9	23.8	0.0	32	7.9	23.8	263.9	95	0.0	7.9	49
Pacific.....	9.5	0.0	3.2	0.0	6	3.2	15.8	106.0	41	0.0	0.0	38
Total.....	11.9	0.5	3.2	0.6	18	2.3	31.1	75.5	31	0.0	1.7	114

**PLAGUE INFECTION IN PLACER COUNTY, CALIF.**

Under date of Sept. 17, 1946, plague infection was reported proved, on Sept. 16, in a pool of 7 fleas from 12 chipmunks trapped at a beach at Lake Tahoe, Placer County, Calif., and received at the laboratory on Aug. 26.

# FOREIGN REPORTS

## CANADA

*Provinces—Communicable diseases—Week ended August 31, 1946.*—During the week ended August 31, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....				23	44	7	11	17	13	115
Diphtheria.....		2	1	29	5	3	1		1	42
Dysentery:										
Amebic.....								3		3
Bacillary.....									4	4
Encephalitis, infectious.....							1			1
German measles.....					4			2	10	16
Influenza.....						3				3
Measles.....		12		23	41	16	35	46	8	181
Meningitis, meningococcus.....					2				2	4
Mumps.....				16	86	18	57	22	31	230
Poliomyelitis.....	11	2	4	216	39	5	9	15		301
Scarlet fever.....		1	3	15	35	5	2	9	5	75
Tuberculosis (all forms).....		1	15	95	48	21	13	1	48	242
Typhoid and paratyphoid fever.....			1	19	5		6		11	42
Undulant fever.....				1	3					4
Venereal diseases:										
Gonorrhea.....	6	21	21	152	134	1 159	32	42	127	1 694
Syphilis.....	1	14	4	115	80	1 33	12	9	75	1 343
Whooping cough.....		10	3	41	47	3	3	16	1	124

<sup>1</sup> Includes delayed reports for weeks ended Aug. 17 and 24, 1946.

## CUBA

*Habana—Communicable diseases—4 weeks ended September 14, 1946.*—During the 4 weeks ended September 14, 1946, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria.....	14		Poliomyelitis.....	3	1
Malaria.....	10		Tuberculosis.....	10	3
Measles.....	2		Typhoid fever.....	12	1

*Provinces—Notifiable diseases—4 weeks ended September 7, 1946.*—During the 4 weeks ended September 7, 1946, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana <sup>1</sup>	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer.....	3	11	15	12	1	9	51
Cerebrospinal meningitis.....					1		1
Diphtheria.....	4	18	1		2		25
Hookworm disease.....		35		6			41
Leprosy.....		4		1			5
Lethargic encephalitis.....				1			1
Malaria.....	4	12		3	2	9	30
Measles.....		7			3		10
Poliomyelitis.....	7	5	2	9	1	1	25
Rabies (human).....						1	1
Tuberculosis (respiratory).....	44	37	16	29	7	41	174
Typhoid fever.....	17	42	4	82	9	45	199
Undulant fever.....					1		1
Whooping cough.....					3	1	4

<sup>1</sup> Includes the city of Habana.



## FINLAND

*Notifiable diseases—July 1946.*—During the month of July 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	13	Paratyphoid fever.....	302
Diphtheria.....	539	Poliomyelitis.....	20
Dysentery, unspecified.....	16	Scarlet fever.....	173
Gonorrhea.....	1,712	Syphilis.....	413
Malaria.....	29	Typhoid fever.....	56

## JAPAN

*Notifiable diseases—4 weeks ended August 24, 1946, and year to date.*—During the 4 weeks ended August 24, 1946, and the year to date, cases of certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended Aug. 24, 1946	Total cases reported for the year to date	Disease	4 weeks ended Aug. 24, 1946	Total cases reported for the year to date
Cholera.....	518	882	Paratyphoid fever.....	1,102	5,593
Diphtheria.....	2,015	31,971	Scarlet fever.....	109	1,282
Dysentery.....	22,995	39,743	Smallpox.....	36	17,642
Encephalitis, Japanese "B".....	47	1,103	Typhoid fever.....	4,945	30,681
Malaria.....	5,665	15,410	Typhus fever.....	175	30,621
Meningitis, epidemic.....	100	1,111			

<sup>1</sup> For the period June 2, 1946, to date.

## NEW ZEALAND

*Notifiable diseases—4 weeks ended August 10, 1946.*—During the 4 weeks ended August 10, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis.....	10	1	Malaria.....	7	—
Diphtheria.....	230	7	Poliomyelitis.....	5	—
Dysentery:			Puerperal fever.....	8	—
Amebic.....	2	—	Scarlet fever.....	124	—
Bacillary.....	16	1	Trachoma.....	5	—
Erysipelas.....	15	1	Tuberculosis (all forms).....	153	53
Food poisoning.....	7	—	Typhoid fever.....	12	4
Influenza.....	1	1	Undulant fever.....	4	—

## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

### Cholera

*China.*—Cholera has been reported in China as follows: Anhwei Province—August 11–20, 1946, 56 cases, 12 deaths; Chekiang Province—July 21–31, 1946, 37 cases, 4 deaths; August 11–20, 1946, 40 cases, 2 deaths; Fukien Province—Foochow, August 1–10, 1946, 133 cases, 24 deaths; Honan Province—August 1–10, 1946, 336 cases, 66 deaths; Hopeh Province—July 21–31, 1946, 33 cases, 30 deaths, including 33 cases, 11 deaths in Tientsin; Kiangsi Province—August 1–10, 1946, 55 cases, 21 deaths; Kiangsu Province—August 11–20, 1946, 341 cases, 36 deaths, including 329 cases, 35 deaths in Shanghai; August 21–31, 1946, 195 cases, 23 deaths in Shanghai; Kwangsi Province—August 1–10, 1946, 83 cases, 31 deaths; Kwangtung Province—August 1–10, 1946, 198 cases, 60 deaths; August 21–31, 1946, 111 cases, 35 deaths in Swatow.

*Korea.*—Cholera has been reported epidemic in Korea, beginning in April or May, with a total of 11,351 cases and 7,399 deaths up to about September 1, 1946.

*On Vessel—SS Lyons Creek.*—Information dated September 18, 1946, stated that the *SS Lyons Creek* arrived at Ras Tanura, Arabia, from Singapore, Straits Settlements on August 29, 1946, with cases of suspected cholera on board among members of the crew. Later tests showed the disease to be cholera of the less virulent type.

### Plague

*Canada—Saskatchewan.*—Under date of September 14, 1946, plague infection was reported in Saskatchewan, Canada, as follows: In a pool of 247 fleas from 33 ground squirrels collected at Alsask and in a pool of 246 fleas from 28 ground squirrels collected at Superb.

*China.*—Plague infection has been reported in China as follows: Fukien Province—July 21–31, 1946, 42 cases, 38 deaths; August 1–10, 1946, 76 cases, 42 deaths, including 17 cases, 6 deaths at Foochow; Kiangsi Province—July 21–31, 1946, 33 cases, 4 deaths in Nanchang; August 1–10, 1946, 50 cases, 16 deaths; Yunnan Province—August 21–31, 1946, 19 cases, 1 death.

**Yellow Fever**

*Colombia—Santander Department.*—For the period June 19 to July 17, 1946, 1 death from yellow fever was reported in Bolivar Municipality and 3 deaths from yellow fever were reported in San Vincente de Chucuri, Santander Department, Colombia.

*Gold Coast—Tamale.*—On September 9, 1946, 1 case of suspected yellow fever was reported in Tamale, Gold Coast, death occurring on September 14, 1946. All precautionary measures have been taken.

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

*THOMAS PARRAN, Surgeon General*

**DIVISION OF PUBLIC HEALTH METHODS**

*G. ST. J. PERROTT, Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

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## THE INDUSTRIAL "CONTROL CHART" APPLIED TO THE STUDY OF EPIDEMICS

By WILLIS H. RICH, *Professor of Biology, Stanford University*, and M. C. TERRY,  
M. D., *Palo Alto, California*

Epidemiologists and health officers have always made use of statistical methods and it is routine with them to graph the incidence of disease as a simple and effective method for discovering and showing changes in this incidence. However, the ordinary graph of incidence against time contains no criterion on which to base a judgment as to when the incidence first rises above what may be considered a normal level. This is especially to be desired for those diseases characterized by a fairly constant, long-continued, low incidence which only occasionally flares up to epidemic proportions. This paper describes such a criterion.

In recent years there has been developed a powerful new statistical tool known as the "control chart" which industry has welcomed and is putting to new uses almost daily. This has proved to be an important aid to industrial management in maintaining constant quality of product because of the fact that it early shows up any tendency to produce an undue proportion of defective articles or of articles falling outside of acceptable limits, whether in length, weight, or any other measurable property. Somewhat different procedures are followed in the treatment of data dealing with defective articles as compared with those arising from measurements, but the final results are similar. When properly applied to suitable data the chart provides a continuous, day by day, up-to-the-minute graphic analysis so that any significant deviation from normal, satisfactory operation becomes immediately apparent, while, at the same time, unimportant deviations are clearly designated as such.

The health officer, striving to see ahead as he extends his daily or weekly graph of the incidence of a transmissible disease may well adopt such an industrial tool. The control chart has previously been applied to another biological problem (7), and this led to consideration



of the possibility that the method might have an important application in the analysis of epidemiological data. A study was made of the records of acute anterior poliomyelitis in California, and this study appears to show clearly that the method may become of use in more ways than one to the health officer and epidemiologist. The study was started shortly before the epidemic of 1943 and, on the basis of control chart evidence, the existence of the epidemic was shown several weeks before it was otherwise apparent.

Details as to the principles and methods of this kind of analysis are given in the literature (1) (2) (3), and it must suffice here to state briefly the fundamental characteristics of such charts and, to show how those used in this study were prepared.

The source of data is the report of incidence contained in the Weekly Bulletin of the State Department of Health (now published under the title "California's Health") for the years 1929 to 1943 inclusive. The data are given in table 1. The first week for each year is the first week ending in the new year and may, therefore, in the extreme cases, include the days December 26 to January 1, or the days January 1 to January 7, inclusive. This is sufficiently accurate for the immediate purpose and is convenient because of the way in which cases are reported in the Bulletin.

The control charts are made by plotting points on ordinary coordinate paper with time as the horizontal scale (the X-axis) and the number of new cases reported each week as the vertical scale (the Y-axis). Two horizontal lines above the X-axis distinguish this control chart from the usual graph of the health officer. One of these lines, designated by the symbol  $\bar{X}$  ("bar X" or "X bar") corresponds to the mean number of the new cases reported each week for selected periods unmarked by epidemics and therefore is regarded as normal for the purposes of this study. The second line, designated by the symbol U. C. L., is known as the upper control limit and represents a calculated value such that the odds against its occurrence by chance during a nonepidemic period are approximately 200 to 1. (See figs. 1 and 2.)

The selection of "nonepidemic" periods was made primarily on a subjective basis but most epidemics of poliomyelitis are so well marked that there could be little disagreement as to which were and which were not epidemic periods. The first selection was of the three consecutive years, 1931 to 1933, during which nothing remotely resembling an epidemic occurred (fig. 1). Later, other similar but shorter periods were added and the first 10 weeks of 1931 were eliminated because it seemed probable that these had been affected by the obvious epidemic of 1930. In general a period was not considered to be nonepidemic if there was any doubt as to its proper designation. The bias, if any, is conservative and it is believed that the application

TABLE 1.—*Weekly incidence of acute anterior poliomyelitis (number of reported cases) in California, 1929 to 1943, inclusive*

Week	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
1.....	1	2	14	5	3	2	16	7	4	5	0	9	3	2	2
2.....	3	3	8	3	1	8	15	6	3	2	3	14	1	1	10
3.....	1	3	11	3	2	4	14	1	7	3	1	7	1	4	7
4.....	3	2	7	1	3	4	10	2	2	1	0	11	3	1	1
5.....	1	7	8	1	1	3	12	1	2	3	0	9	1	3	10
6.....	4	0	9	3	1	10	10	2	2	4	2	2	3	1	3
7.....	3	1	6	2	1	3	13	9	0	3	2	3	3	4	5
8.....	2	0	6	3	0	5	10	1	1	3	0	3	3	4	3
9.....	2	2	4	3	0	5	11	4	0	1	2	4	2	2	3
10.....	0	3	12	5	2	2	12	1	3	2	1	1	2	2	2
11.....	3	4	3	7	1	6	9	4	1	1	1	3	1	2	7
12.....	3	2	2	3	3	7	5	5	0	6	0	3	2	3	2
13.....	0	3	2	0	2	3	6	4	0	0	0	3	1	6	1
14.....	1	4	3	4	3	7	5	1	3	2	0	4	1	0	5
15.....	0	3	4	0	3	8	7	4	4	1	3	2	0	0	5
16.....	1	0	5	3	3	10	2	4	4	2	0	2	1	2	5
17.....	1	3	6	4	0	11	4	3	2	0	4	4	4	1	5
18.....	1	6	4	2	1	14	3	1	4	0	4	2	3	1	8
19.....	3	13	0	2	1	21	7	4	5	1	2	5	3	2	12
20.....	5	15	4	4	4	37	3	6	3	0	3	4	3	0	14
21.....	3	13	2	2	2	96	6	4	2	3	5	9	5	1	13
22.....	3	18	3	0	0	160	3	5	5	3	18	9	7	3	13
23.....	3	32	10	3	2	284	9	3	6	2	5	14	5	1	35
24.....	4	46	6	1	1	281	20	2	4	2	15	11	6	1	27
25.....	5	52	7	2	5	345	32	6	7	1	14	15	8	2	56
26.....	5	80	3	5	4	299	33	7	9	2	17	34	7	2	62
27.....	4	92	6	4	3	277	31	8	8	2	17	16	2	3	74
28.....	5	97	6	3	3	218	29	8	11	4	46	29	8	4	105
29.....	4	96	3	2	5	158	36	7	19	2	52	16	1	7	101
30.....	4	88	5	4	4	119	22	13	22	9	45	18	9	3	121
31.....	2	76	4	6	5	87	25	16	38	6	58	18	8	3	149
32.....	3	60	8	4	3	110	31	8	36	1	49	14	7	3	122
33.....	7	51	4	6	1	80	43	8	38	6	58	23	6	6	100
34.....	11	60	4	6	3	73	34	15	36	11	49	16	16	9	168
35.....	7	62	6	2	2	72	26	12	47	7	61	13	7	12	147
36.....	4	49	9	12	3	55	23	26	40	4	45	21	8	23	130
37.....	3	62	11	4	4	72	22	15	38	5	51	12	8	11	112
38.....	6	68	9	3	4	56	29	17	46	3	40	9	10	13	148
39.....	6	76	10	3	5	43	26	20	41	2	58	16	10	4	120
40.....	1	70	6	5	4	52	30	18	32	8	47	10	6	17	108
41.....	5	76	8	5	4	42	26	10	17	1	31	10	9	10	76
42.....	5	85	8	3	8	38	20	15	31	3	34	10	6	16	75
43.....	0	70	6	4	5	30	20	8	19	2	35	8	4	19	88
44.....	2	60	4	4	4	17	11	4	18	0	21	9	4	24	69
45.....	3	46	3	5	5	31	8	11	26	2	23	2	6	8	63
46.....	3	44	5	6	4	22	12	9	14	0	27	2	2	16	76
47.....	3	27	5	2	4	23	17	9	12	2	25	7	4	23	60
48.....	3	28	3	1	4	25	4	9	13	0	16	3	9	14	28
49.....	3	13	3	3	7	21	6	7	10	2	20	5	2	19	29
50.....	1	14	3	2	6	14	7	13	2	4	7	3	7	13	18
51.....	1	19	3	3	1	9	10	6	5	0	8	1	3	7	18
52.....	2	13	1	3	3	28	5	3	0	1	3	2	1	13	9
53.....				0						0					11

of the standards based on these selected periods to the entire series of data shows that the standards are reasonable.

The upper control limit is commonly determined by adding to the mean, or  $\bar{X}$  value, a sum equal to three times the standard deviation of the individual items as they occurred over a period of normal operation. When thus determined the odds against the chance occurrence of a value at this level, or above it, are approximately 740 to 1—assuming, of course, that the distribution is actually of the type com-

monly called the normal distribution. These odds are higher than is considered desirable in the application of the control chart to epidemiological study. Furthermore, these data do not conform to the normal distribution but do form a close approximation to what is known as a Poisson distribution. (See below and reference (6), paragraph 10.46.) Therefore, odds of 200 to 1 were selected as a standard and the U. C. L. value corresponding to these odds has been determined from the convenient graph given by Working (reference (5), plate 3, probability limit 0.995). Calculated in the usual manner the  $\bar{X}$  value for nonepidemic periods comes out at the level of four new cases per week and the upper control limit (U. C. L.) is determined as 10 per week.

As typically applied in industry a "lower control limit" is also needed but it has no significance in such a case as the one under consideration in which the interest is, for the present at least, entirely in determining significant deviations from normal in the direction of increased incidence.

The assumption that the data under consideration actually represent an acceptable approximation to a Poisson distribution has been tested by the "chi-square test of goodness of fit" (reference (4), p. 77 ff.), and it has been shown that for periods unaffected by epidemics in either the first or the second 20 weeks of any one year the assumption is justified. Furthermore, if all of the data are combined for nonepidemic periods falling within the second 20 weeks of the years studied, the resulting frequency distribution forms an exceedingly good approximation to a Poisson except for the fact that there are a few more weeks showing exceptionally high incidence than are called for in a true Poisson. For all practical purposes, it is believed that the assumption that the data are essentially Poisson distributions is justified and that interpretations will not be materially distorted.

The theory is, of course, that so long as the points remain below the upper control limit a "constant cause system" is operating and that nothing unusual or untoward has occurred, the observed, slight variations being due to chance. When points fall above that limit it may be assumed fairly that some new cause is operating. In industry this is taken to mean that the process is "out of control" and that a "basis for action" exists at the moment of this early warning.

It is especially to be noted that it is essential to the control chart method that the standards,  $\bar{X}$  and U. C. L., be based on a distribution of data that shows the characteristics of a random sample. The mean and the upper control limit are used as a basis for differentiating between random variations and those due to "assignable causes" and it is obvious that, unless these standards themselves are based on random sampling, the fundamental principle of the control chart method is violated. Only when the standards are derived from essentially

random sampling can one interpret points falling beyond the control limits as "out of control." The normal, the Poisson, and the binomial are the best known ideal distributions and it is a reasonable requirement that data used to determine standards should conform approximately to one or another of these three types (reference (6), ch. 10).

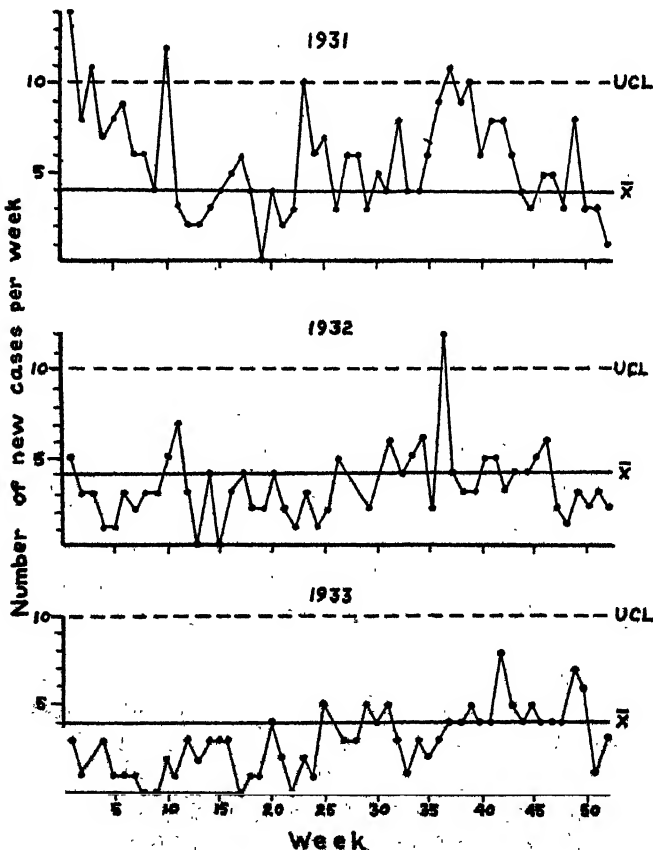
If, now, table 1 is examined it will be seen that the standards of this study conform to this principle. In the entire 15 years, during periods that are clearly not affected by oncoming or receding epidemics, there were very few individual weeks in which the reported incidence was above the upper control limit of 10, and in each instance the incidence was above the U. C. L. for the one week only; it dropped the following week to within the normal levels. In every case in which the incidence rose above the U. C. L. and remained there for two or more successive weeks the rise proved to be the beginning of an epidemic—either one of major proportions or what is considered to be a minor epidemic. Therefore, it may be concluded that, if the incidence of poliomyelitis in California rises above 10 per week and remains above this level for two successive weeks, an epidemic exists; and that any available measures should be taken to prevent the further spread of the disease. Undoubtedly, any marked increase in incidence would be noted by the epidemiologist even without the aid of the control chart, but the chart distinguishes immediately the significant from the nonsignificant variations in incidence.

It is well known that poliomyelitis epidemics in the United States usually develop during the summer and fall and this is clearly shown to have been true in California. Only in 1934 and 1943 was the epidemic clearly established before the twentieth week. In addition, the data show a slight but significant tendency for the incidence during nonepidemic periods to be higher during the summer and fall than during the winter and spring. This is true even in years that are entirely free from epidemic occurrence. These facts are pertinent to a consideration of the periods that have been selected as normal and from which have been calculated the mean and the upper control limit.

Preliminary examination of the data showed that the lowest level of what may be called normal incidence prevailed during the first 20 weeks of the year (up to approximately the end of May); that a somewhat higher incidence prevailed for the next 20 weeks (up to about the end of September); and that the last 12 weeks of the year were marked by a generally falling incidence, returning to the lower level of the first 20 weeks. Therefore the mean incidence was determined for the first 20 weeks and for the second 20 weeks separately for those periods that appeared to be normal and unaffected by either past or approaching epidemics. Periods, none of which were of less than 8 weeks' duration, were used as normal. During the 15 years of the record there was a total of 213 weeks that were considered normal and

that fell within the first 20 weeks of the year; and for these the mean incidence was 2.31 cases per week. Within the second 20 weeks of the year there were only 80 weeks during the years of record that were considered normal, because of the fact that there were so few extended periods during this part of the year that were unaffected by epidemics and could be considered as normal. The mean incidence for these 80 weeks was 3.98 cases per week. When these two means (2.31 and 3.98) are compared by applying the usual test for the significance of the difference of two means (reference (4), p. 103 ff.) it is seen that the chance of a difference as great or greater than the one observed being due purely to the "errors of random sampling" is extremely small.

Because so many of the epidemics first show up during the second 20 weeks of the year, and because this is the more conservative procedure, the mean for the second 20 weeks (approximated fairly by 4) has been used as the standard. The line of the mean,  $\bar{X}$ , is therefore drawn at this level above the X-axis. Since the data are of a type that justifies the assumption that the distribution approxi-



mates a Poisson series, the upper control limit has been determined from figure 4 in reference (1), page 20. For a mean of 4 this sets the U. C. L. at 10, with, as has been said, odds of about 200 to 1 against this value being exceeded by chance.

Figure 1 presents such a control chart applied to the 3 years, 1931 to 1933, that were originally selected as the standard, nonepidemic period. The upper panel of figure 2 presents the control chart on the same scale as in figure 1 for the early months of 1943 but this scale is too large to show conveniently the incidence during the epidemic that characterized 1943 after the eighteenth week. The data for the entire year are therefore given with a reduced scale in the lower panel.

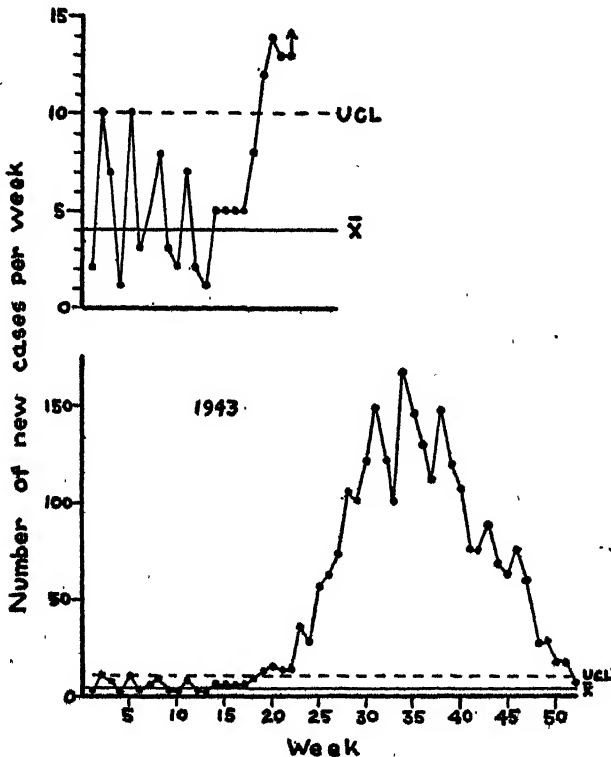


FIGURE 2.

The way in which an epidemic is forecast by the control chart is illustrated in figure 2. Immediately preceding the epidemic there were 4 weeks in which the incidence ranged from 12 to 14 cases—not high enough to cause apprehension as seen on the ordinary graph yet clearly above the safety zone as shown on the control chart. Following this the incidence jumped to 35 in the next week and from then on the epidemic continued until nearly the end of the year. The authors noted these earliest evidences of an epidemic but had

just begun the study and were doubtful of the significance of the observation.

A refinement of the simple technique described above is possible and may be important when there are marked seasonal fluctuations in incidence of a disease. Instead of using a simple arithmetic mean as the standard, a cyclic curve of trend may be fitted to the data and this curve used as the standard of comparison. This fitting may be done by several methods such as the moving average or the sine-cosine curve. (See Croxton and Cowden (9) for these methods.) This fitted curve gives, in effect, the average number of new cases for each week, taking into consideration the seasonal variation. This curve may be used as the  $\bar{X}$  line. From the calculated values of the curve and figure 4 in reference (1), probability=0.995, the upper control limit for each week can be determined just as when the simple mean is used.

To illustrate this a sine-cosine curve has been fitted to the data and for 1942 and the first 23 weeks of 1943 (fig. 3). The equation of the  $\bar{X}$  line is:

$$\bar{X} = 3.613 - 1.622 \sin (6.923 W)^{\circ} - 0.795 \cos (6.923 W)^{\circ}$$

in which, as before,  $\bar{X}$  is the line of trend of weekly incidence and  $W$  is the number of the week. In this case there is little if any difference in interpretation of the significance of variations whether taken from the arithmetic mean or the line of trend.

Another refinement that may be required is to remove the effect of a long-time (secular) trend such as might come from an increase in population. This may be done by standard methods but it is beyond the scope of this paper to go into this. Schilling (8) has made excellent use of both of these refinements.

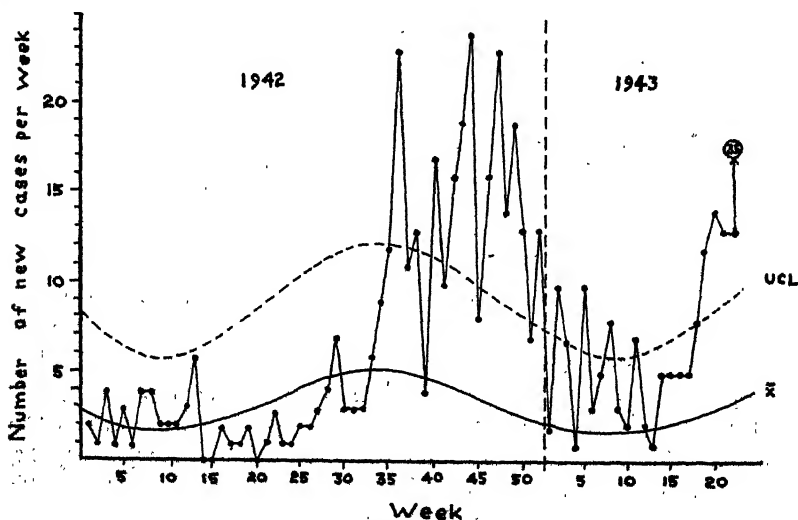


FIGURE 3.

In both figures 2 and 3 it will be noted that the incidence was continually above the mean ( $\bar{X}$ ) during 5 weeks preceding the week in which the incidence rose above the upper control limit. Such patterns, while not conclusive, may well be cause to suspect that an epidemic is in the making and, on this basis, preliminary steps might be justified that would provide better control if an epidemic does develop. As applied in industry, patterns of this sort, even though they stay within the control limits, are interpreted as indicating that all is not well and action is taken in order to prevent the process from going clearly "out of control." When present they strengthen materially the interpretation that points falling above the upper control limit are significant of an unfavorable change in the process. It appears, in short, that, as applied to epidemic diseases, advance information is to be found between the  $\bar{X}$  and the U. C. L. lines that can provide a warning to the health officer and a lead to the epidemiologist—information pointing toward the existence of the epidemic condition even before the incidence has risen to the level of the upper control limit. This feature alone would seem amply to justify the use of the control chart principles in maintaining a graphic record of the incidence of diseases subject to epidemic spread.

"Minor epidemics" were identified as periods of several weeks' duration during which the incidence is distinctly higher than during those periods that were considered normal, but that neither last as long nor show the still higher incidence of the typical epidemic. It is not implied that there is any sharp line of distinction between these minor epidemics and typical epidemics, but both are characterized by the fact that the general level of incidence remains for weeks or months above the upper control limit established for nonepidemic periods.

The significance of these minor epidemics is not known but it is believed that they would be worthy of careful investigation because of the light they might throw on the factors involved in the development of the more typical epidemics. It might be found that these minor epidemics are local affairs that, for some reason, do not spread generally throughout any considerable portion of the population of the State. On the other hand, it might be found that they represent only a general, widespread high incidence that does not attain epidemic proportions even in restricted localities. The epidemiological implications would be quite different if one or the other of these two possibilities were affirmed. If the increased incidence is due to localized but intensive epidemics, it would indicate the existence of conditions inhibiting the spread of the disease from one locality to another. But if these minor epidemics represent a general higher level of incidence, it would point toward the existence of general, widespread factors that, perhaps, affect the susceptibility of a con-



siderable part of the population, the virulence of the virus, or the means of transmission.

Other features of the natural history of poliomyelitis epidemics are also indicated by these charts. The fact that there is a distinct difference in the normal level of incidence during the second 20 weeks of the year as compared with the first 20 weeks of the year has already been noted. There is some indication of different normal, nonepidemic levels in different years. Some preliminary work also has been done that indicates that there is a difference in the course of epidemics in the southern as compared with the northern parts of California, with the line drawn at the point where the Tehachapi Range divides the State into two fairly well-marked geographic and ecologic sections. A more detailed study of these and other characteristics of the incidence of poliomyelitis in California by means of the control chart would seem to offer possibilities of discovering facts regarding the ecological factors affecting the spread of the disease and of providing a basis for action that might effect a better control.

The following quotation from the recent book, *Virus as Organism*, by F. M. Burnet (reference (10), p. 68) is pertinent to this thought: "But, whatever increase in knowledge and understanding the future may bring, the study of poliomyelitis will still demand an ecological approach. Infantile paralysis is a changing disease that has not yet reached a standardized expression, and its manifestations may continue to change in this second half-century of its existence as an epidemic disease. Only some dynamic interpretation based on the changing requirements for survival of a virus whose environment is being altered by its host species' changing social habits can give an adequate comprehension of the phenomena. Such an ecological approach will have the additional merit of opening up new lines of fruitful investigation which we may hope will eventually allow an adequate formulation of the history and the natural history of poliomyelitis."

The results of this graphical analysis show, it is believed, that the industrial control chart may prove to be of general usefulness in many kinds of epidemiological work. When actually applied to epidemiological problems, it may be expected that various refinements in presentation and interpretation will be made that will increase this usefulness. As applied especially to acute anterior poliomyelitis, there is reason to hope that a more detailed statistical analysis of incidence will serve to throw further light on the causes of the epidemics as such. If the method is useful, as it is believed to be, in the study of such a disease as poliomyelitis, which has rather more than its share of unknowns, one may anticipate that it will be found useful in other like studies in the field of public health and epidemiology and even, perhaps, in the analysis of vital statistics in still wider fields.

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## AN EVALUATION OF THREE PLAGUE VACCINES AGAINST INFECTION IN GUINEA PIGS INDUCED BY NATURAL AND ARTIFICIAL METHODS<sup>1</sup>

By N. E. WAYSON, *Medical Director*, MARGARET C. McMAHON, *Senior Medical Technician*, and FRANK M. PRINCE, *Assistant Entomologist*, *United States Public Health Service*

The protective value of many prophylactic injections against communicable diseases of man must be estimated from the reactions obtained by their application to animals which are not the natural subjects of the respective diseases, and in which the pathogenesis of the artificially induced infection is not closely comparable to that of the disease acquired by man through natural channels.

Bubonic plague is a disease of rodents and its pathogenesis in these animals and in man is so similar when it is acquired by the bites of infected fleas that an attempt to appraise the protective value of vaccines against the infection acquired by guinea pigs through natural, as well as through artificial methods, should contribute evidence of their probable value in protecting man.

The guinea pig was selected as the test animal because it is very susceptible to infection with plague, and usually dies when infected. Furthermore, fleas which are vectors will feed on it with avidity, and the animal lends itself to easy manipulation under the precautions which are desirable. The rat flea (*Xenopsylla cheopis*) was used as

<sup>1</sup> From Headquarters, Plague Laboratory, Plague Suppressive Measures, San Francisco, Calif. This paper was scheduled for publication in *PUBLIC HEALTH REPORTS* in the issue of June 11, 1943. Because of the subject matter the paper was withheld from publication at that time.

the experimental vector because of its broad geographical distribution and the general acceptance of its capacity as a natural vector.

The vaccine preparations tested were made of *Pasteurella pestis* cultures which were killed by treatment with phenol or formalin. The phenolized suspensions were precipitated with ethyl alcohol or with both alcohol and alum. The choice of these preparations resulted from a number of experiments with both white mice and guinea pigs as test animals. Results obtained in these previous experiences indicated that vaccines prepared from cultures of *P. pestis* which were incubated at temperatures lower than 37° C. did not afford as good protection as those in which the organism was grown at 37° C. or higher. A temperature of 39° C. was chosen for incubation because of the development of the larger envelope about the organisms grown on blood agar at this temperature, and because of their close morphological resemblance to the organisms grown in animals at 39° C. to 40° C. The interval of 21 or more days between the first dose of the vaccine and the infecting dose seemed necessary to obtain protection, and the divided dose of vaccine appeared to produce slightly better results. Alcohol precipitation was selected because of favorable reports on its use in the preparation of typhoid and tularemia antigens. The details of preparation and the dosage administered are appended.

Groups of 10 guinea pigs of about 300 gm. weight, obtained from a producer, were given the respective vaccines subcutaneously and 3 weeks later were subjected from time to time during a period of a month to the bites of infected fleas; or were given on the twentieth or twenty-first day, a quantity of *P. pestis* a thousandfold larger than that given control animals which were untreated. The specificity of the protection was compared with that afforded by United States Army typhoid vaccine. The details of the tests and results are recorded in the protocols appended.

The fleas were infected by feeding on a guinea pig with an advanced stage of septicemia which had been induced by the inoculation of a strain of *P. pestis* which was heterologous to that used in the vaccines. Each flea was preserved and fed separately and each was used in the tests when it was believed likely to transmit the infection. Those more likely to transmit the infection have usually developed an obstruction or "block" of the proventriculus occasioned by the growth of a colony of the bacteria in it. Such fleas can be recognized by their restless behavior when applied to the skin for feeding, and by their failure to engorge. They seldom live more than a few days after they have become blocked, and in an effort to be assured that opportunity for transmission had been provided, it was necessary to test a large number of those which were probably infected.

Fleas which killed any of the animals with plague by biting were classified as "vectors." Those which did not kill by biting, but which were found to be infected by producing the disease in a mouse when triturated in saline and injected subcutaneously were classified as "infected." However, the tests which were accepted as satisfactory were those in which a proved vector was used, except in one instance in which the results were well defined, but the flea died before being placed on a control animal. Hence, there were animals among those receiving vaccine injections which developed clinical plague and recovered but which were not included in the statistical evaluation of the protection.

The clinical criteria of successful transmission has been determined by several years of experience with flea transmission. Both vectors and infected fleas produced such clinical evidence of having produced plague by biting. This evidence consists of a red puncture point which is surrounded promptly or within 15 to 30 minutes by a red areola of from 3 to 5 mm. in diameter. The appearance of the red areola or spot is followed within 24 to 72 hours by the development of a red papule at the site, and the subsequent enlargement of contiguous lymph nodes with accompanying fever. Among nonimmune guinea pigs these developments are followed in nearly all instances by septicemia and death within the next 2 weeks. Neither the red spot, papule, nor adenopathy have developed after the bites of noninfected fleas under experimental conditions.

The tests were completed by a pathological and bacteriological examination of each animal at necropsy. Those which recovered or did not develop clinical plague were killed 20 or more days after their exposure to the flea bites, or were injected with a suspension of the virulent culture which was homologous with that used to infect the fleas. All fleas which had not proved themselves vectors were examined to determine whether they were infected.

The protection afforded the animals which received the vaccine injections, and were exposed to the bites of vectors, or to both vectors and infected fleas is summarized in table 1.

TABLE 1

Preparation used	Number animals tested	Clinical plague	Death with plague
Alcohol-precipitated vaccine.....	8	8	0
Alcohol-alum-precipitated vaccine.....	5	4	0
Commercial vaccine.....	8	7	3
Typhoid vaccine.....	8	7	6
Untreated.....	15	13	11

The evolution of the lesions produced in the immunized animals which recovered was remarkably similar to that which occurs in human cases which recover. The infiltration and edema of the papule

gradually disappear within a few days, and the site is marked by a hairless scar often surmounted by a small scale. The course of the lymphadenopathy may be a gradual resolution of the edema and infiltration about the node and the slow progressive diminution of its size to that which is nearly normal; it remains definitely hard. On section, the center of these small hard nodes is sometimes colliquated. In some cases the acute inflammation of the affected node may subside, but the node remains large and becomes larger and soft. Later, a fistula may form in the skin and the abscessed node drain. During the acute phases of the infection the animals become thin, lose the tone in their muscles, and occasionally lose much of their hair; recovery of their general health is rather slow.

Among the nonimmunized animals, the site of the papule is prone to ulcerate if death does not occur within a few days. If the course of the disease is slow, the buboes remain large and infiltrated, but seldom become soft or ulcerated, and the animal becomes much weaker and thinner before death.

A second series of guinea pigs, consisting of 5 groups of 10 animals each, was given, respectively, a divided dose of alcohol-precipitated, alcohol-alum-precipitated, and commercial plague vaccine, typhoid vaccine, and a single dose of alcohol-alum-precipitated vaccine. A control group of 12 animals received no treatment. All the animals were inoculated subcutaneously 3 weeks later with large doses of a suspension of a heterologous strain of virulent *P. pestis*. The test animals, including those receiving typhoid vaccine, were given doses a thousandfold larger than the doses given to untreated controls. The results obtained among this series are indicated in table 2.

TABLE 2

Preparation used	Animals tested	Death with plague
Alcohol-precipitated (vaccine).....	10	2
Alcohol-alum-precipitated (vaccine) (divided dose).....	10	4
Alcohol-alum-precipitated (vaccine) (single dose).....	10	3
Commercial plague vaccine.....	10	6
Typhoid vaccine.....	10	9
Controls (no treatment).....	12	9

A pathological and bacteriological examination was made at necropsy of each animal which died, or which survived and was killed 3 weeks after inoculation.

The two series of tests indicate that plague vaccines prepared by either of the methods adopted will afford much protection to guinea pigs against plague which is acquired through natural or artificial methods, and that the protection induced is specific insofar as the comparison was made with that which may be conferred by typhoid vaccine. Each series shows that a better protection is afforded by a phenolized and alcohol-precipitated suspension of a North American

ground squirrel strain of *P. pestis* than by a formalinized suspension of an East Indian strain (Commercial). There is no evidence in these tests that the additional precipitate obtained by alcohol and alum increased the protective value of the vaccine.

Impressions gained in the conduct of these and other experiences suggest that an interval of 25 or more days between the final protective injection and the infecting dose may result in an even greater degree of protection. Also, it appears that doses of a relatively large number of the bacteria are necessary, and that the degree of protection bears some relation to the size of the dose, although it is not proportionate.

The protection developed in guinea pigs against natural infections of plague by the use of specific vaccines suggests that similar preparations may be efficacious in man.

#### **Details of Preparation of Plague Vaccines**

##### ***Alcohol Precipitate***

A. Strain B 3035 of *P. pestis* isolated from ground squirrel, Wyoming, July 1940, and maintained on 5-percent blood hormone agar slants at approximately 5° C. Immediately previous to use, the strain was passed through a guinea pig and recovered from the heart blood. The seed cultures were sown on 5-percent blood tryptose beef-heart agar and incubated at 39° C. for 40 hours. The growth was harvested in 5-percent phenolized normal saline and allowed to stand at 5° C. for 20 hours. The number of organisms per cubic millimeter was estimated by turbidity standards, checked against freshly prepared barium sulfate standards, the specified content of typhoid vaccine of recent manufacture by the United States Army, and by Wright's counting method.

B. Two volumes of 95-percent alcohol were added to the phenolized saline suspension and held overnight at 5° C. This was centrifuged until a clear supernatant was obtained, the supernatant discarded, the sediment washed in saline solution, centrifuged, and resuspended in saline and merthiolate (1-7,500) to make the original volume of the phenolized saline suspension.

This constituted the alcohol-precipitated vaccine.

##### ***Alcohol-and-Alum Precipitate***

A. The same as for alcohol precipitate.

B. Two volumes of 95-percent alcohol were added to the phenolized saline suspension and held overnight at 5° C. Two and seven-tenths cubic centimeters of 10-percent sodium bicarbonate and 25 cc. of 4-percent potassium alum per 100 cc. of volume were added and the mixture allowed to stand at 5° C. for 5 hours. The supernatant was removed by centrifugation and the sediment resuspended in saline and held at 5° C. for 40 hours, centrifuged, and the suspension diluted

to the original volume of the phenolized saline suspension with saline and merthiolate (1-7,500).

This constituted the alcohol- and alum-precipitated vaccine.

Tests for sterility were made on the phenolized saline suspension and on the finished precipitated products.

#### *Commercial*

*Indian Rat Strain No. 337 (Hooper Research Laboratories, California).*—The strain stock should be kept in 5-percent blood (rabbit or guinea pig) agar slants, in sealed tubes at a temperature of 5° to 8° C. and their pathogenicity should be tested immediately previous to use in the manufacture of large stocks of the vaccine.

Seed cultures are grown in hormone or hormone-sulfite broth<sup>2</sup> for from 48 to 72 hours at 27° to 30° C. The broth cultures of individual strains are used to seed hormone or hormone-sulfite agar in Blake bottles. The bottles are incubated for 48 hours at 30° C. and during the period of incubation are tilted from time to time to accomplish uniformity in the spread of the surface growth. At the end of the period of incubation, the surface growth is washed down with a 0.25 percent neutral formalin in buffered saline. The suspension so prepared is allowed to stand at room temperature from 6 to 12 hours before further manipulation is attempted. Usually it is then found to be sterile, but check tests should be made by planting 1-cc. volumes in each of several hormone broth tubes which should be incubated for from 48 to 72 hours at 30° C. In the meantime the suspension is pipetted off and, if necessary, strained through a cotton gauze filter to remove small particles of agar. A count is then made by the direct count technique, or by other methods of equivalent validity. The removal of the formalin can be facilitated by the use of a vacuum pump and by placing the flasks of suspensions in a water bath at 37° C. The standard strength of two thousand million organisms per cubic centimeter should be obtained by suitable dilution with an approved disinfectant of proper strength in buffered saline solution (0.5 percent phenol in buffered saline). If more than one strain is used in the production of the vaccine, the final product should contain equal portions of the respective stock suspensions.

#### *United States Army Typhoid Vaccine*

Stock of current manufacture.

#### *Challenge strain*

W496, isolated from ground squirrel, Washington, May 1940. The inoculum was prepared by incubating each of five transfer cultures in blood broth for 24 hours at 30° C. A guinea pig was inoculated with one-thousandth of a loop of the final culture,

<sup>2</sup> Meyer, K. F., and Batchelder, A.; Selective mediums in the diagnosis of rodent plague. *J. Infec. Dis.* 29: 370-385 (Nov. 1926).

and upon the death of the animal the organism was recovered by plating the heart blood on blood agar. Checks of identity and purity of the cultures were made with differential media.

PROTOCOL No. 1.—*The protection of guinea pigs treated with vaccines prepared from Pasteurella pestis against bites of infected fleas*

[P=plague; D=death; S=survival; No P=plague not found]

Vaccine preparation	Vaccine					Chal-lenge		Results			Remarks
	Guinea pig No.	Amount in billions	Treatment dosage		Date injected	Flea bites		Clinical	Deaths, survivals	Necropsy	
			Date in-jected	Amount in billions		Vector	Infected				
Alcohol precipi-tate.	11	1.5	1943 Feb. 9	1.5	1943 Feb. 15	0	1	P	S	No P	Accepted without control.
	12	1.5	Feb. 9	1.5	Feb. 15	2	2	P	S	No P	Killed 30th day.
	13	1.5	Feb. 9	1.5	Feb. 15	3	7	P	S	No P	Killed 20th day.
	14	1.5	Feb. 9	1.5	Feb. 15	1	0	P	S	No P	Killed 30th day.
	15	1.5	Feb. 9	1.5	Feb. 15	1	0	P	S	No P	Died 22d day.
	16	1.5	Feb. 9	1.5	Feb. 15	---	1	No P	S	No P	No test (no con-trol).
	17	1.5	Feb. 9	1.5	Feb. 15	1	0	P	S	No P	Killed 40th day.
	18	1.5	Feb. 9	1.5	Feb. 15	1	2	P	S	No P	Died 7th day.
	19	1.5	Feb. 9	1.5	Feb. 15	5	4	P	S	No P	Killed 20th day.
	20	1.5	Feb. 9	1.5	Feb. 15	0	1	No P	S	No P	No test (no con-trol).
Alcohol-and-alum precipitate.	41	1.5	Feb. 9	1.5	Feb. 15	0	5	P	S	No P	No test (no con-trol).
	42	1.5	Feb. 9	1.5	Feb. 15	1	0	P	---	No P	Death 5th day.
	43	1.5	Feb. 9	1.5	Feb. 15	0	0	---	---	No P	No test.
	44	1.5	Feb. 9	1.5	Feb. 15	0	2	P	S	No P	No test (no con-trol).
	45	1.5	Feb. 9	1.5	Feb. 15	1	0	P	S	No P	Killed 30th day.
	46	1.5	Feb. 9	1.5	Feb. 15	0	4	No P	S	No P	No test (no con-trol).
	47	1.5	Feb. 9	1.5	Feb. 15	2	3	P	S	No P	Killed 21st day.
	48	1.5	Feb. 9	1.5	Feb. 15	1	0	P	S	No P	Killed 30th day.
	49	1.5	Feb. 9	1.5	Feb. 15	1	3	No P	S	No P	Injected.
	50	1.5	Feb. 9	1.5	Feb. 15	0	5	P	S	No P	No test (no con-trol).
Commercial....	81	1.5	Feb. 9	1.5	Feb. 15	0	2	No P	S	No P	No test (no con-trol).
	82	1.5	Feb. 9	1.5	Feb. 15	2	1	P	S	No P	Killed 26th day.
	83	1.5	Feb. 9	1.5	Feb. 15	1	1	P	S	No P	Killed 21st day.
	84	1.5	Feb. 9	1.5	Feb. 15	2	1	P	D	No P	
	85	1.5	Feb. 9	1.5	Feb. 15	2	3	No P	S	No P	Injected.
	86	1.5	Feb. 9	1.5	Feb. 15	1	1	P	S	No P	Killed 32d day.
	87	1.5	Feb. 9	1.5	Feb. 15	1	1	P	D	No P	
	88	1.5	Feb. 9	1.5	Feb. 15	2	0	P	S	No P	Killed 45th day.
	89	1.5	Feb. 9	1.5	Feb. 15	2	0	P	D	No P	
	90	1.5	Feb. 9	1.5	Feb. 15	0	0	---	---	---	No test.
Typhoid.....	101	1.5	Feb. 9	1.5	Feb. 15	1	0	P	D	P	
	102	1.5	Feb. 9	1.5	Feb. 15	0	4	P	S	No P	No test (no con-trol).
	103	1.5	Feb. 9	1.5	Feb. 15	1	1	P	S	No P	Killed 21st day.
	104	1.5	Feb. 9	1.5	Feb. 15	0	0	---	---	(?)	No test.
	105	1.5	Feb. 9	1.5	Feb. 15	1	0	P	D	P	
	106	1.5	Feb. 9	1.5	Feb. 15	1	3	No P	S	No P	Injected.
	107	1.5	Feb. 9	1.5	Feb. 15	1	1	P	D	P	
	108	1.5	Feb. 9	1.5	Feb. 15	1	0	P	D	P	
	109	1.5	Feb. 9	1.5	Feb. 15	3	3	P	D	P	
	110	1.5	Feb. 9	1.5	Feb. 15	1	1	P	D	P	

<sup>1</sup> Recovered from clinical plague, and was injected with virulent culture: Survived, necropsy, no plague.

<sup>2</sup> Did not develop clinical plague and was injected with virulent culture: Sick, necropsy, plague.

<sup>3</sup> Did not develop clinical plague and was injected with virulent culture: Survived, necropsy, no plague.

<sup>4</sup> Recovered from clinical plague and was injected with virulent culture: Survived, necropsy, no plague.

<sup>5</sup> Did not develop clinical plague and was injected with virulent culture: Death, necropsy, plague.

<sup>6</sup> Did not develop clinical plague and was injected with virulent culture: Survived, necropsy, no plague.



PROTOCOL No. 1.—*The protection of guinea pigs treated with vaccines prepared from Pasteurella pestis against bites of infected fleas*—Continued

Vaccine preparation	Vaccine					Chal-lenge		Results			Remarks
	Guinea pig No.	Amount in billions	Treatment dosage		Date injected	Flea bites		Clinical	Deaths, survivals	Necropsy	
			Date in-jected	Amount in billions		Vector	Infected				
Control, no treat-ment.	61		1943		1943	1	1	P	D	P	
	62					1	0	P	D	P	
	63					1	0	P	D	P	
	64					1	0	P	D	P	
	65					1	0	P	D	P	
	66					0	1	P	D	P	Buboes for 50 days.
	67					1	0	P	D	P	No test (No vector).
	68					1	0	P	D	P	
	69					1	1	P	D	P	Killed 25th day.
	70					1	0	P	D	P	
	113					1	2	No	P	( <sup>1</sup> )	Injected.
	114					1	0	P	D	P	
	115					1	0	P	D	P	
	116					1	1	P	D	P	
	117					1	2	No	P	( <sup>1</sup> )	Injected.
	118					1	0	P	D	P	

<sup>7</sup> Did not develop clinical plague and was injected with virulent culture: Death, necropsy, plague.

<sup>8</sup> Did not develop clinical plague and was injected with virulent culture: Sick, necropsy, plague.

PROTOCOL No. 2.—*The protection of guinea pigs treated with vaccines prepared from ground squirrel and Indian rat strains of Pasteurella pestis against injections of a heterologous virulent ground squirrel strain*

Vaccine						Challenge		Deaths, plague	Survivals, no plague	Remarks
Preparation	Number of guinea pigs treated	Treatment dosage				Dosage				
		Amount in billions	Date injected	Amount in billions	Date injected	Amount in thousands	Date injected			
Alcohol precipitate..	10	1.5	1943 Feb. 9	1.5	1943 Feb. 15	2,200	1943 Mar. 2	2	8	Survivals killed after 23 days.
Alcohol-and-alum precipitate.	10	1.5	Feb. 9	1.5	Feb. 15	2,200	Mar. 2	4	6	Survivals killed after 23 days.
Commercial.....	9	1.5	Feb. 9	1.5	Feb. 15	2,200	Mar. 2	5	4	Survivals killed after 23 days.
	7	1.5	Feb. 9	1.5	Feb. 15	1,700	Mar. 6	1	0	Survivals killed after 23 days.
Typhoid.....	3	1.5	Feb. 9	1.5	Feb. 15	2,200	Mar. 2	7	0	Survivals killed after 23 days.
	10	1.5	Feb. 9	1.5	Feb. 15	1,700	Mar. 6	2	1	Survivals killed after 23 days.
No treatment.....	3					2.2	Mar. 2	7	3	Survivals killed after 23 days.
	2					1.7	Mar. 6	2	0	

<sup>1</sup> One death on 21st day, but no findings of plague.

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 23, 1946

#### Summary

Decreased incidence of poliomyelitis was recorded during the week in all sections of the country except the New England, Middle Atlantic, and South Atlantic areas. Increases occurred, however, in certain States in all sections except the Mountain area. The total for the week is 1,296, as compared with 1,427 last week, 774 and 976 for the corresponding weeks, respectively, of 1945 and 1944, and a 5-year median of 679. Of 35 States reporting 5 or more cases and showing changes, 18 reported an increase (557 to 681), while a decline (764 to 551) occurred in the other 17 States. The 10 States showing increases and reporting more than 11 cases are as follows (last week's figures in parentheses): Massachusetts 28 (16), New York 117 (90), Pennsylvania 19 (14), Ohio 52 (46), Indiana 27 (22), Wisconsin 95 (94), Missouri 90 (72), Nebraska 34 (33), Arkansas 25 (13), California 129 (124). The total for the year to date (39 weeks) is 18,498, as compared with 9,657 and 14,546, respectively, for the corresponding periods of 1945 and 1944, and a 5-year median of 9,309.

A total of 313 cases of diphtheria was reported, as compared with 295 last week, 532 for the corresponding week last year, and a 5-year median of 444. The cumulative total is 11,436, as compared with 10,749 for the same period last year and a 5-year median of 9,374. As compared with the corresponding period last year, an aggregate increase occurred in the New England, Middle Atlantic, North Central, and Mountain areas (3,784 to 5,384), while a decrease (6,965 to 6,052) was recorded in the South Atlantic, South Central, and Pacific areas.

A total of 991 cases of influenza was reported for the current week, as compared with 1,115 for the corresponding week last year and a 5-year median of 905.

Deaths recorded for the week in 93 large cities of the United States totaled 8,186, as compared with 8,246 last week, 8,378 and 7,993, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,289. The total for the year to date is 354,019, as compared with 349,926 for the same period last year.

*Telegraphic morbidity reports from State health officers for the week ended Sept. 28, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Sept. 28, 1946	Sept. 29, 1945		Sept. 28, 1946	Sept. 29, 1945		Sept. 28, 1946	Sept. 29, 1945		Sept. 28, 1946	Sept. 29, 1945	
NEW ENGLAND												
Maine.....	0	0	0	—	—	—	13	—	—	0	0	1
New Hampshire.....	0	0	0	1	—	—	3	—	—	0	0	0
Vermont.....	1	1	0	1	—	—	33	2	3	0	0	0
Massachusetts.....	24	7	3	—	—	—	71	37	40	1	2	3
Rhode Island.....	2	0	0	—	14	—	3	1	3	1	0	0
Connecticut.....	0	0	2	1	—	—	9	2	6	2	2	2
MIDDLE ATLANTIC												
New York.....	18	14	9	14	(1)	11	46	12	42	5	12	12
New Jersey.....	3	2	2	2	3	3	12	12	25	2	1	3
Pennsylvania.....	16	9	9	—	—	1	69	53	51	5	10	10
EAST NORTH CENTRAL												
Ohio.....	16	22	8	1	5	5	14	4	22	5	4	4
Indiana.....	6	8	8	2	10	10	4	3	3	1	5	1
Illinois.....	13	3	7	1	1	2	15	33	18	5	5	5
Michigan <sup>1</sup> .....	4	26	5	3	—	—	15	38	38	1	3	3
Wisconsin.....	16	0	1	18	14	14	22	22	40	2	4	2
WEST NORTH CENTRAL												
Minnesota.....	4	6	6	—	—	1	2	4	4	0	1	0
Iowa.....	3	2	6	—	—	—	6	—	2	1	2	0
Missouri.....	3	8	8	2	—	—	2	1	3	0	10	2
North Dakota.....	1	0	1	4	1	1	—	—	4	0	0	0
South Dakota.....	2	3	4	—	—	—	1	1	1	0	0	0
Nebraska.....	2	1	1	3	—	—	2	1	4	1	0	0
Kansas.....	2	10	4	4	—	1	2	7	7	1	0	0
SOUTH ATLANTIC												
Delaware.....	0	0	0	—	—	—	—	—	2	0	0	0
Maryland <sup>1</sup> .....	6	17	4	—	—	2	9	1	7	0	2	2
District of Columbia.....	0	0	0	—	—	—	4	—	1	0	0	0
Virginia.....	27	13	16	161	148	72	12	7	7	4	6	3
West Virginia.....	2	6	6	—	—	—	—	—	2	3	0	1
North Carolina.....	12	82	69	—	—	—	8	6	6	1	1	1
South Carolina.....	1	20	25	30	166	171	3	8	15	0	0	2
Georgia.....	10	24	25	2	3	20	7	4	4	0	2	1
Florida.....	11	1	6	5	4	4	1	—	1	2	3	1
EAST SOUTH CENTRAL												
Kentucky.....	26	22	12	—	—	2	—	5	2	2	3	1
Tennessee.....	6	54	23	4	14	7	1	9	6	0	4	1
Alabama.....	11	25	29	28	15	15	5	8	7	2	2	0
Mississippi <sup>1</sup> .....	10	21	11	—	—	—	—	—	—	1	0	0
WEST SOUTH CENTRAL												
Arkansas.....	8	16	15	—	10	23	2	3	3	1	2	0
Louisiana.....	3	13	6	—	26	5	5	1	1	0	1	1
Oklahoma.....	1	4	5	17	17	17	4	—	2	0	0	0
Texas.....	15	46	46	624	625	451	39	34	17	3	5	2
MOUNTAIN												
Montana.....	0	1	1	3	2	2	3	63	14	1	0	0
Idaho.....	0	0	0	6	3	—	4	37	6	0	0	0
Wyoming.....	0	0	0	1	—	1	—	—	1	0	0	0
Colorado.....	2	6	6	32	14	16	5	2	8	1	1	1
New Mexico.....	1	3	3	2	5	1	7	2	2	0	0	0
Arizona.....	2	1	1	22	12	31	3	—	3	1	0	0
Utah <sup>1</sup> .....	0	2	0	1	—	—	2	4	3	1	0	0
Nevada.....	0	0	0	—	—	—	—	—	—	0	0	0
PACIFIC												
Washington.....	5	6	6	—	—	1	5	65	16	0	1	3
Oregon.....	2	1	1	1	—	4	11	10	22	2	0	2
California.....	17	26	19	5	3	14	43	110	92	6	7	7
Total.....	313	532	444	991	1,115	905	627	612	647	64	101	101
39 weeks.....	11,436	10,749	9,374	195,844	76,184	85,825	642,181	104,737	542,892	4,799	6,679	6,679

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Sept. 28, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>1</sup>		
	Week ended—		Me-dian 1941-45	Week ended—		Me-dian 1941-45	Week ended—		Me-dian 1941-45	Week ended—		Me-dian 1941-45
	Sept. 28, 1946	Sept. 29, 1945		Sept. 28, 1946	Sept. 29, 1945		Sept. 28, 1946	Sept. 29, 1945		Sept. 28, 1946	Sept. 29, 1945	
NEW ENGLAND												
Maine.....	2	2	2	22	12	12	0	0	0	0	0	0
New Hampshire.....	10	2	0	5	4	2	0	0	0	0	0	0
Vermont.....	7	2	1	0	2	2	0	0	0	0	0	1
Massachusetts.....	28	30	22	30	63	68	0	0	0	9	3	7
Rhode Island.....	13	3	1	3	1	3	0	0	0	0	1	0
Connecticut.....	6	11	11	10	16	13	0	0	0	0	2	2
MIDDLE ATLANTIC												
New York.....	117	108	108	89	99	99	0	0	0	8	11	12
New Jersey.....	10	47	29	23	22	30	0	0	0	6	3	2
Pennsylvania.....	19	52	52	54	93	80	0	0	0	8	9	13
EAST NORTH CENTRAL												
Ohio.....	52	36	36	93	99	99	0	0	0	6	10	9
Indiana.....	27	8	8	26	23	25	0	0	0	2	2	2
Illinois.....	131	71	37	41	68	76	0	1	0	5	2	4
Michigan <sup>1</sup> .....	60	19	19	43	61	69	0	0	0	3	16	4
Wisconsin.....	95	56	12	30	36	52	0	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota.....	66	26	16	15	30	28	0	1	0	1	0	0
Iowa.....	31	23	9	17	19	26	0	0	0	0	0	0
Missouri.....	90	12	12	18	35	32	1	0	0	4	3	5
North Dakota.....	25	0	1	0	5	3	0	0	0	0	1	0
South Dakota.....	6	7	1	1	3	5	0	0	0	0	0	0
Nebraska.....	34	6	8	10	5	12	0	0	0	0	2	0
Kansas.....	66	8	8	11	44	44	0	0	0	1	0	1
SOUTH ATLANTIC												
Delaware.....	6	1	2	4	4	3	0	0	0	0	2	1
Maryland <sup>1</sup> .....	5	12	12	18	29	23	0	0	0	2	1	5
District of Columbia.....	2	8	3	4	9	9	0	0	0	1	0	1
Virginia.....	3	11	8	27	70	41	0	0	0	1	17	8
West Virginia.....	1	5	4	26	63	58	0	0	0	1	1	4
North Carolina.....	11	7	8	33	55	55	0	0	0	1	4	3
South Carolina.....	1	2	3	1	13	13	0	0	0	2	3	6
Georgia.....	3	1	2	10	16	21	0	0	0	3	4	4
Florida.....	7	12	4	6	2	5	0	0	0	3	1	4
EAST SOUTH CENTRAL												
Kentucky.....	4	3	6	26	34	34	0	0	0	2	3	5
Tennessee.....	5	12	7	27	42	43	0	0	0	3	6	6
Alabama.....	4	8	4	11	16	28	0	0	0	2	6	6
Mississippi <sup>1</sup> .....	11	4	3	16	8	8	0	0	0	0	4	4
WEST SOUTH CENTRAL												
Arkansas.....	25	3	1	6	18	4	0	2	0	4	5	5
Louisiana.....	5	1	2	1	10	6	0	0	0	1	2	4
Oklahoma.....	12	6	2	3	4	10	0	0	0	1	3	3
Texas.....	28	36	7	18	85	32	0	0	0	14	12	13
MOUNTAIN												
Montana.....	9	10	3	2	7	8	0	0	0	1	1	1
Idaho.....	2	2	0	10	7	7	0	0	0	2	2	2
Wyoming.....	7	2	1	3	1	1	0	0	0	0	0	0
Colorado.....	41	4	4	6	8	11	0	0	0	1	0	1
New Mexico.....	8	0	0	0	6	3	0	0	0	3	6	6
Arizona.....	2	1	1	8	4	4	0	0	0	1	1	1
Utah <sup>1</sup> .....	10	15	3	2	11	11	0	0	0	1	0	0
Nevada.....	0	0	0	3	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	27	13	8	17	22	22	0	0	0	0	0	2
Oregon.....	4	5	5	11	9	9	0	0	0	1	0	1
California.....	129	52	18	77	109	96	0	0	0	7	0	6
Total.....	1,298	774	679	912	1,408	1,385	1	4	3	111	149	168
39 weeks.....	418,498	9,867	9,309	90,904	140,782	104,359	293	283	630	3,225	3,820	4,352

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 8; New York 1; Ohio 1; Illinois 2; Virginia 1; Florida 1; Arkansas 1; Oklahoma 1; Texas 3; Montana 1; New Mexico 1; Utah 1; California 4.

Delayed reports: Arkansas, week ended August 3, 1 case (included in cumulative total only).

Telegraphic morbidity reports from State health officers for the week ended Sept. 28, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Sept. 28, 1946							
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Sept. 28, 1946	Sept. 29, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	21	57	35	—	—	—	—	—	—	—	2
New Hampshire.....	4	6	2	—	—	—	—	—	—	—	—
Vermont.....	13	11	11	—	—	—	—	—	—	—	1
Massachusetts.....	110	114	109	—	3	—	—	—	—	*1	—
Rhode Island.....	30	20	26	—	—	—	—	—	—	—	—
Connecticut.....	20	22	27	—	—	—	1	—	—	—	3
MIDDLE ATLANTIC											
New York.....	132	316	316	4	17	—	—	—	—	1	2
New Jersey.....	128	156	133	—	—	2	—	—	—	—	—
Pennsylvania.....	115	142	142	—	—	—	—	—	—	1	1
EAST NORTH CENTRAL											
Ohio.....	96	107	129	60	—	1	—	—	—	—	5
Indiana.....	20	13	19	—	—	—	8	4	—	—	4
Illinois.....	102	82	145	8	—	—	—	2	—	—	9
Michigan.....	161	88	191	—	2	—	—	—	—	—	1
Wisconsin.....	211	69	187	—	—	—	—	—	—	—	9
WEST NORTH CENTRAL											
Minnesota.....	12	11	37	2	—	—	—	—	—	—	2
Iowa.....	27	1	21	1	—	—	—	—	—	—	—
Missouri.....	19	24	23	—	—	1	—	—	1	—	1
North Dakota.....	2	5	13	—	—	—	—	—	—	—	—
South Dakota.....	—	5	5	—	—	—	—	—	—	—	2
Nebraska.....	1	4	7	—	—	—	—	—	—	—	—
Kansas.....	7	8	23	—	—	—	—	—	—	—	2
SOUTH ATLANTIC											
Delaware.....	3	4	3	—	—	—	—	—	—	—	—
Maryland.....	27	52	52	—	—	1	—	—	—	—	1
District of Columbia.....	3	13	9	—	—	—	—	—	—	—	—
Virginia.....	44	41	41	—	—	32	—	2	—	—	3
West Virginia.....	11	12	10	—	—	—	—	—	—	—	1
North Carolina.....	38	54	103	—	—	—	—	3	1	2	—
South Carolina.....	3	43	43	—	—	—	—	—	—	2	2
Georgia.....	1	3	10	1	3	—	—	8	—	12	2
Florida.....	11	1	3	—	—	1	—	—	2	23	6
EAST SOUTH CENTRAL											
Kentucky.....	20	52	33	—	—	1	—	—	—	—	—
Tennessee.....	22	14	20	—	—	—	—	—	4	7	1
Alabama.....	4	11	14	—	—	—	1	—	—	7	1
Mississippi.....	—	—	—	—	—	—	—	—	4	1	4
WEST SOUTH CENTRAL											
Arkansas.....	0	15	20	1	—	—	—	—	6	2	—
Louisiana.....	—	2	5	2	—	—	—	—	—	1	3
Oklahoma.....	—	5	3	—	—	—	—	—	—	—	—
Texas.....	135	124	123	11	194	13	1	—	—	29	8
MOUNTAIN											
Montana.....	—	5	10	—	—	—	—	—	2	—	—
Idaho.....	7	10	2	—	—	2	—	—	—	—	—
Wyoming.....	5	3	6	—	—	—	—	—	—	—	—
Colorado.....	15	27	27	4	1	—	—	—	—	—	2
New Mexico.....	5	7	7	—	5	11	1	—	—	1	—
Arizona.....	3	3	3	—	5	38	—	—	—	—	—
Utah.....	14	11	21	—	—	—	—	—	—	—	—
Nevada.....	—	—	—	—	—	—	1	—	—	—	—
PACIFIC											
Washington.....	35	16	18	—	—	—	—	—	—	—	—
Oregon.....	7	6	19	—	—	9	—	—	—	—	—
California.....	75	155	155	8	3	—	4	—	—	4	3
Total.....	1,728	1,950	2,333	97	228	110	17	14	20	88	78
Same week, 1945.....	1,950	—	—	49	451	392	28	17	13	166	86
Average, 1943-45.....	1,986	—	—	42	470	273	20	4	11	130	—
39 weeks: 1946.....	75,875	—	—	2,196	13,591	5,180	497	529	717	2,676	3,832
1945.....	97,536	—	—	1,432	20,071	8,734	483	437	589	3,674	3,607
Average, 1943-45.....	106,263	—	139,386	1,456	16,696	7,284	515	434	564	3,076	—

\* Period ended earlier than Saturday.

† 5-year median, 1941-45.

‡ Anthrax: New York 1 case.

§ Leprosy: New York 1 case; Texas 1 case.

¶ Cases presumably malarial, not yet proved.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 31, 1946

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Etiophthalmis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyositis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	—	0	—	0	2	0	0	0	0	3
New Hampshire:												
Concord.....	0	0	—	0	—	0	0	1	1	0	0	—
Vermont:												
Barre.....	0	0	—	0	—	0	0	0	0	0	0	—
Massachusetts:												
Boston.....	1	0	—	0	5	1	7	6	5	0	0	36
Fall River.....	0	0	—	1	—	0	0	0	1	0	0	3
Springfield.....	0	0	—	0	1	0	0	0	0	0	0	14
Worcester.....	0	0	—	0	—	0	4	8	0	0	0	18
Rhode Island:												
Providence.....	0	0	—	0	1	0	2	0	1	0	0	13
Connecticut:												
Bridgeport.....	0	0	—	0	1	0	0	1	0	0	0	—
Hartford.....	0	0	—	0	—	0	0	1	0	0	0	2
New Haven.....	0	0	—	0	1	0	1	0	1	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo.....	2	0	—	0	—	0	2	0	5	0	0	8
New York.....	12	1	2	1	13	2	50	42	23	0	4	38
Rochester.....	0	0	—	0	—	0	0	0	2	0	0	1
Syracuse.....	0	0	—	0	—	0	2	1	2	0	1	8
New Jersey:												
Camden.....	0	0	—	0	1	0	0	0	0	0	0	3
Newark.....	0	0	—	0	1	1	2	0	1	0	0	12
Trenton.....	0	0	1	0	—	0	1	0	1	0	0	2
Pennsylvania:												
Philadelphia.....	0	0	1	0	2	1	12	5	7	0	2	33
Pittsburgh.....	0	0	—	0	11	0	9	1	4	0	0	16
Reading.....	0	0	—	0	—	1	1	0	1	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	3	0	—	—	—	0	6	7	7	0	0	3
Cleveland.....	0	0	—	0	3	0	4	23	10	0	0	11
Columbus.....	0	1	—	0	—	0	2	0	5	0	0	5
Indiana:												
Fort Wayne.....	0	1	—	0	—	0	0	0	0	0	0	1
Indianapolis.....	1	1	—	0	—	4	5	12	3	0	0	5
South Bend.....	0	0	—	0	1	0	0	1	0	0	0	—
Terre Haute.....	0	0	—	0	1	0	0	2	0	0	0	—
Illinois:												
Chicago.....	0	0	—	0	6	2	14	62	17	0	0	77
Michigan:												
Detroit.....	1	1	1	0	2	1	3	19	13	0	0	89
Flint.....	0	0	—	0	—	0	2	0	0	0	0	2
Grand Rapids.....	0	0	—	0	—	0	0	10	1	0	0	3
Wisconsin:												
Kenosha.....	1	0	—	0	—	0	0	6	0	0	0	4
Milwaukee.....	0	0	—	0	1	0	5	11	5	0	0	120
Racine.....	0	0	—	0	1	0	0	3	2	0	0	—
Superior.....	1	0	—	0	1	0	0	8	1	0	0	—
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	—	0	1	0	1	13	0	0	0	2
Minneapolis.....	0	0	—	0	—	0	1	21	5	0	0	—
St. Paul.....	0	0	—	0	—	0	2	7	1	0	0	6
Missouri:												
Kansas City.....	2	0	—	0	—	0	5	9	0	0	0	2
St. Joseph.....	0	0	—	0	—	0	0	1	0	0	0	5
St. Louis.....	1	0	1	0	1	1	6	24	2	0	0	—

## City reports for week ended Sept. 21, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliovirulent cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0	-----	0	-----	0	1	13	1	0	0	-----
Kansas:												
Topeka.....	0	0	-----	1	-----	0	0	1	0	0	0	3
Wichita.....	0	0	-----	0	-----	0	2	3	1	0	0	-----
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	-----	0	0	1	1	0	0	-----
Maryland:												
Baltimore.....	5	0	2	1	2	1	6	2	4	0	0	32
Cumberland.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Frederick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0	-----	0	4	0	7	2	2	0	0	7
Virginia:												
Lynchburg.....	1	0	-----	0	1	0	0	0	3	0	0	1
Richmond.....	0	0	21	0	2	1	1	0	7	0	0	1
Roanoke.....	3	0	-----	0	-----	0	0	0	0	0	0	-----
West Virginia:												
Wheeling.....	0	0	-----	0	-----	0	0	0	1	0	0	1
North Carolina:												
Raleigh.....	0	0	-----	0	-----	0	1	0	0	0	0	6
Wilmington.....	0	0	-----	0	-----	0	1	0	1	0	0	1
Winston-Salem.....	0	0	-----	0	-----	0	1	1	5	0	0	2
South Carolina:												
Charleston.....	2	0	1	0	-----	0	3	0	0	0	0	-----
Georgia:												
Atlanta.....	0	0	-----	0	-----	0	1	0	1	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Savannah.....	0	0	-----	0	1	0	1	0	0	0	0	-----
Florida:												
Tampa.....	1	0	-----	0	-----	0	1	1	2	0	0	-----
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	3	0	-----	0	1	0	8	1	1	0	0	2
Nashville.....	0	0	-----	0	-----	1	7	0	1	0	0	-----
Alabama:												
Birmingham.....	0	0	2	0	3	0	0	1	0	0	0	-----
Mobile.....	1	0	4	2	-----	1	2	0	0	0	0	2
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	-----	0	0	1	0	0	0	-----
Louisiana:												
New Orleans.....	*4	0	*4	0	*6	*3	*9	2	1	0	*4	*5
Shreveport.....	0	0	-----	0	-----	0	4	0	0	0	0	-----
Texas:												
Dallas.....	1	0	-----	0	-----	0	3	2	6	0	0	9
Galveston.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Houston.....	1	0	-----	0	-----	0	2	5	3	0	0	-----
San Antonio.....	0	0	-----	0	-----	0	2	1	0	0	0	-----
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Great Falls.....	0	0	-----	0	1	0	0	3	0	0	0	1
Helena.....	0	0	-----	0	-----	0	0	1	0	0	0	-----
Missoula.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	-----	0	0	0	0	0	0	1
Colorado:												
Denver.....	3	0	-----	0	1	1	2	7	2	0	0	13
Utah:												
Salt Lake City.....	0	0	-----	0	2	0	0	4	4	0	0	1

\*Including monthly reports from Charity Hospital. Figures not used in computing rates.

## City reports for week ended Sept. 21, 1946—Continued

Division, State, and city	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	1	0	—	0	—	0	2	9	0	0	0	3
Spokane.....	0	0	—	0	—	0	0	9	1	0	0	—
Tacoma.....	0	0	—	0	—	0	0	3	2	0	0	1
California:												
Los Angeles.....	3	0	—	0	11	1	3	30	8	0	0	14
Sacramento.....	0	0	—	0	—	0	2	0	0	0	0	1
San Francisco.....	1	0	—	0	1	1	5	2	4	0	0	3
Total.....	51	5	36	6	36	21	220	420	194	0	7	665
Corresponding week, 1945.....	62	—	21	3	175	—	217	—	272	0	27	730
Average, 1941-45.....	60	—	35	18	160	—	234	—	291	0	29	847

1 3-year average, 1943-45.

2 5-year median, 1941-45.

Anthrax.—Cases: Philadelphia 1.

Dysentery, amebic.—Cases: Boston 1; New Haven 1; Buffalo 2; New York 3; Rochester 1; Philadelphia 1; Indianapolis 1; Chicago 1; St. Paul 1; Los Angeles 1.

Dysentery, bacillary.—Cases: New York 4; Detroit 1; Charleston, S. C. 1; Los Angeles 3.

Dysentery, unspecified.—Cases: San Antonio 2.

Rocky Mountain spotted fever.—Cases: Nashville 1.

Typhoid fever.—Cases: Lynchburg 1; New Orleans 1.

Typhus fever, endemic.—Cases: Atlanta 3; Tampa 1; Mobile 1; Little Rock 6; New Orleans 10, including monthly reports from Charity Hospital; Houston 2.

## Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 34,182,000)

	Diphtheria case rates	Etiophallitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polliomylitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	2.6	0.0	0.0	2.6	24	2.6	41.8	44.4	24	0.0	0.0	256
Middle Atlantic.....	6.5	0.5	1.9	0.5	13	2.3	36.6	22.7	24	0.0	3.2	56
East North Central.....	4.3	2.5	0.6	0.0	10	4.3	25.1	97.5	30	0.0	0.0	196
West North Central.....	6.0	0.0	2.0	2.0	4	2.0	36.2	215.2	20	0.0	0.0	46
South Atlantic.....	20.1	0.0	40.2	1.7	17	3.3	38.5	11.7	45	0.0	0.0	85
East South Central.....	23.6	0.0	35.4	11.8	24	11.8	100.3	11.8	12	0.0	0.0	24
West South Central.....	8.1	0.0	0.0	0.0	0	0.0	44.5	31.6	20	0.0	0.0	36
Mountain.....	26.0	0.0	0.0	0.0	35	2.7	26.0	130.0	52	0.0	0.0	139
Pacific.....	7.9	0.0	0.0	0.0	19	3.2	19.0	83.8	24	0.0	0.0	35
Total.....	7.9	0.8	5.6	0.9	13	3.3	34.2	64.3	30	0.0	1.1	103

## PLAGUE INFECTION IN PLACER COUNTY, CALIF.

Under date of September 23, 1946, plague infection was reported proved, on September 20, in Placer County, Calif., in pools of 30 fleas from 3 ground squirrels, *C. beecheyi*, 14 fleas from 16 chipmunks, *Eutamias* sp., and 17 fleas from 2 tamarack squirrels, *Sciurus douglasii albolimbatus*, all shot 1 mile north of Kings Beach, Lake Tahoe, and in a pool of 9 fleas from 7 golden mantled ground squirrels, *Callosperm-*



*philus* sp., shot on the Brockway-Truckee road northwest of Kings Beach. All specimens were received at the laboratory on September 5, 1946.

## TERRITORIES AND POSSESSIONS

### Puerto Rico

*Notifiable diseases—4 weeks ended September 7, 1946.*—During the 4 weeks ended September 7, 1946, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox.....	3	Poliomyelitis.....	67
Diphtheria.....	55	Syphilis.....	124
Dysentery, unspecified.....	8	Tetanus.....	11
Gonorrhea.....	184	Tuberculosis (all forms).....	400
Influenza.....	76	Typhoid and paratyphoid fever.....	6
Malaria.....	391	Typhus fever (murine).....	15
Measles.....	2	Whooping cough.....	28

## DEATHS DURING WEEK ENDED SEPTEMBER 21, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 21, 1946	Correspond- ing week, 1945
Data for 93 large cities of the United States:		
Total deaths.....	8, 248	8, 205
Average for 3 prior years.....	8, 206	
Total deaths, first 38 weeks of year.....	345, 835	341, 548
Deaths under 1 year of age.....	701	607
Average for 3 prior years.....	609	
Deaths under 1 year of age, first 38 weeks of year.....	24, 378	23, 051
Data from industrial insurance companies:		
Policies in force.....	67, 286, 004	67, 310, 855
Number of death claims.....	10, 914	11, 633
Death claims per 1,000 policies in force, annual rate.....	8.5	9.0
Death claims per 1,000 policies, first 38 weeks of year, annual rate.....	9.6	10.2

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended September 7, 1946.*—During the week ended September 7, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		4		9	166	9	12	26	18	244
Diphtheria.....				25	8	1		1	1	36
Dysentery, bacillary.....									3	3
Encephalitis, infectious.....									1	1
German measles.....					4		1	3	5	13
Influenza.....					8	2				10
Measles.....		7	78	19	65	11	36	22	9	247
Meningitis, meningococcus.....		1			1	1		1	1	5
Mumps.....				8	78	19	41	13	24	183
Poliomyelitis.....	4	4	12	120	45	3	5	10	2	205
Scarlet fever.....	1		6	23	23	7		4	1	65
Tuberculosis (all forms).....		7	4	126	40	20	15	49	25	286
Typhoid and paratyphoid fever.....				10	1	2		1	9	23
Undulant fever.....				1	1	1			5	8
Veneral diseases:										
Gonorrhoea.....	3	29	21	125	135	42	46	43	72	516
Syphilis.....		14	3	105	72	17	11	2	40	264
Other forms.....		1								1
Whooping cough.....		15	1	80	50	5		4	2	157

### NEW ZEALAND

*Notifiable diseases—4 weeks ended September 7, 1946.*—During the 4 weeks ended September 7, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis.....	1		Ophthalmia neonatorum.....	1	
Cerebrospinal meningitis.....	20	2	Poliomyelitis.....	3	
Diphtheria.....	139	6	Furuncul fever.....	5	
Dysentery:			Scarlet fever.....	117	1
Amebic.....	4		Tetanus.....	3	
Bacillary.....	6		Trachoma.....	1	
Erysipelas.....	14		Tuberculosis (all forms).....	180	80
Food poisoning.....	10		Typhoid fever.....	8	6
Malaria.....	1		Undulant fever.....	2	

**REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND  
YELLOW FEVER RECEIVED DURING THE CURRENT WEEK**

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the **PUBLIC HEALTH REPORTS** for the last Friday of each month.

**Cholera**

*China*.—Cholera has been reported in China as follows: Fukien Province—August 11–20, 1946, 55 cases, 3 deaths including 54 cases with 3 deaths reported in Foochow; Hopeh Province—August 11–20, 1946, 20 cases, 8 deaths, August 21–31, 1946, 19 cases, September 1–10, 1946, 3 cases all in Tientsin; Hunan Province—August 11–20, 1946, 250 cases, 148 deaths; Kwangtung Province—August 1–10, 1946, 138 cases, 37 deaths, August 11–20, 1946, 200 cases, 60 deaths.

*Manchuria—Jehol Province*.—For the period August 1–10, 1946, 91 cases of cholera with 73 deaths were reported in certain localities of Jehol Province, Manchuria.

**Plague**

*Ecuador—Loja Province—Pindal*.—During the month of August 1946, 4 cases of plague with 2 deaths were reported in Pindal, Loja Province, Ecuador.

**Typhus Fever**

*Ecuador*.—During the month of August 1946, 118 cases of typhus fever with 25 deaths were reported in Ecuador. Provinces reporting the highest incidence are: Cotopaxi, 26 cases, 17 deaths; Pichincha, 26 cases, 5 deaths in Quito; Loja, 23 cases, 1 death; Chimborazo, 10 cases.

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

**G. ST. J. PERROTT, *Chief of Division***

The **PUBLIC HEALTH REPORTS**, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

**VOLUME 61    OCTOBER 25, 1946    NUMBER 43**

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Removal of Schistosome Cercariae by Filtration  
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# Public Health Reports

*Vol. 61 • OCTOBER 25, 1946 • No. 43*

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## ANNOUNCEMENT

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### CONFERENCE OF STATE AND TERRITORIAL HEALTH OFFICERS

The forty-fifth annual conference of the Surgeon General of the United States Public Health Service with the State and Territorial health officers will be held December 2, 3, 4, and 5, 1946, in the auditorium of the United States Public Health Service Building, 19th Street and Constitution Avenue NW, Washington 25, D. C.

All State and Territorial health authorities are urged to attend this conference. The general sessions will be open to all persons wishing to attend.

## NEGRO MORTALITY

### II. THE BIRTH RATE AND INFANT AND MATERNAL MORTALITY<sup>1</sup>

By MARY GOVER, *Statistician, United States Public Health Service*

The growth of the registration area for births has always lagged behind that for deaths; and it is only since approximately 1930 that the area has comprised the States in which the majority of Negroes live. The birth registration area in 1920 included 22 States and the District of Columbia or 62 percent of the white and only 29 percent of the Negro population. By 1927 representation was appreciably better, including 40 States and the District of Columbia, or 90 and 72 percent of the white and Negro populations, respectively, as enumerated in 1920. Since 1933 all States have been included in the birth registration area.

The completeness of the reports of births, as well as the States represented in the birth registration area, has also lagged behind that for deaths. By a process of matching birth and death certificates

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<sup>1</sup> From the Division of Public Health Methods. This is the second (1) in a series of short reports on Negro mortality consisting of data assembled from available sources and prepared at the request of the office of Negro Health Work, U. S. Public Health Service.



and enumeration records, the Bureau of the Census (2) has concluded that birth registration in 1940 was 94 percent complete for the total white and 82 percent complete for the total nonwhite populations of the United States. There were approximately 25 and 50 percent of States in which 10 percent or more of births occurring in 1940 were not registered for white and Negro populations, respectively. In the South Atlantic and South Central sections the completeness of birth registration for nonwhite populations was 60 to 69 percent in three States, 70 to 79 percent in three States, 80 to 89 percent in seven States, and 90 to 99 percent in the remaining four States. Registration is also less in rural than in urban areas,<sup>2</sup> 97 and 90 percent for white and 92 and 77 percent complete for nonwhite populations in urban and rural areas of the United States, respectively. Although the registration of births is obviously incomplete, particularly in certain sections, some progress in registration is shown by a comparison of the Bureau of the Census report for 1940 (2) with the estimates of underreporting made by Whelpton (6) for 1930, in which 25 percent of States in 1940, as opposed to 43 percent in 1930, showed 10 percent or more of white births to have been unregistered.

Allocation by the Bureau of the Census of births and deaths to place of residence has greatly facilitated urban and rural comparisons.

TABLE 1.—*Natality, infant, and maternal mortality for nonwhite and white in urban and rural areas of the United States—resident rates, 1939 to 1943*<sup>1</sup>

Year	Birth rate: Births per 1,000 women 10-54 years	Infant mortality: Infant deaths per 1,000 live births			Maternal mortality: Deaths from puerperal causes per 10,000 live births		
	Total	Total	Urban <sup>2</sup>	Rural <sup>2</sup>	Total	Urban <sup>2</sup>	Rural <sup>2</sup>
Nonwhite							
1939	58.9	74.2	73.2	74.8	76.2	83.5	72.4
1940	60.4	73.8	71.6	75.0	77.3	78.3	79.6
1941	63.0	74.8	71.0	77.1	67.8	( <sup>3</sup> )	( <sup>3</sup> )
1942	65.1	64.6	64.0	65.0	54.4	53.4	55.0
1943	68.1	62.5	65.0	60.8	51.0	48.5	52.6
1944	67.6	60.3	-----	-----	-----	-----	-----
White							
1939	49.3	44.3	41.1	46.8	35.3	24.2	36.1
1940	51.0	43.2	39.0	46.7	32.0	29.8	33.8
1941	53.9	41.2	36.5	45.3	26.6	( <sup>3</sup> )	( <sup>3</sup> )
1942	60.5	37.3	34.3	40.2	22.2	19.9	24.4
1943	62.9	37.5	35.8	39.1	21.1	19.6	22.5
1944	59.3	35.9	-----	-----	-----	-----	-----

<sup>1</sup> Rates for 1939 and 1940 are taken from Vital Statistics Rates in the United States, 1900-1940 (1943) pages 669, 578, and 622 (A). Rates for the years 1915-38, plotted in figures 1 to 3, can be obtained from the same reference. Rates prior to 1933 are for the expanding birth registration States; urban and rural deaths prior to 1939 are recorded for place of occurrence. Rates for 1941-43 are computed from births and deaths as given in Vital Statistics of the United States, Bureau of the Census, 1941, 1942, and 1943.

<sup>2</sup> Urban is defined as cities of 10,000 population or more; rural as cities of less than 10,000 population and rural areas.

<sup>3</sup> Data available in the annual report.

----- Rates under 10,000 population and rural areas.

Allocation to place of residence lowers the urban <sup>3</sup> death rate approximately 8 percent in cities of varying size and raises the rural <sup>3</sup> death rate 13 percent; while it lowers the urban <sup>3</sup> birth rate, per 1,000 population, approximately 20 percent in cities of varying size and raises the rural birth rate 28 percent, 1940 (3).

#### COURSE OF NATALITY AND MORTALITY

Figures 1, 2, and 3 show the course of the birth rate and infant and maternal mortality, since 1920, in the expanding birth registration States for both nonwhite <sup>4</sup> and white. The birth rate is expressed as the number of births per 1,000 women 10 to 54 years of age; infant mortality as deaths under 1 year of age per 1,000 live births; and maternal mortality as deaths of women from puerperal causes per 10,000 live births.

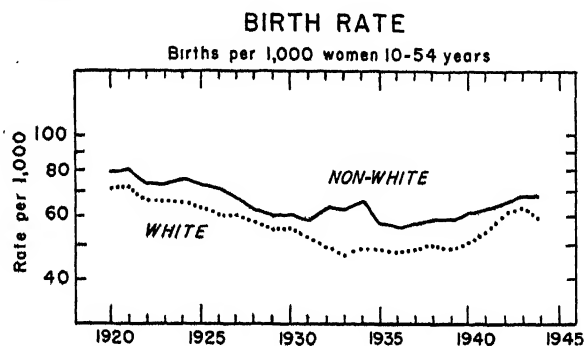


FIGURE 1.—Course of the birth rate in the expanding birth registration States, 1920-43. For table of rates see *Vital Statistics Rates in the United States, 1900-1940*, (4) page 608, and table 1 of this report.

The Negro birth rate (fig. 1) has been roughly 10 to 30 percent higher than the white. Negro as well as white natality declined from 1920 to 1930 at approximately 2.5 percent annually; the years 1932 to 1934 show an unusually high birth rate among Negroes; from 1936 to 1943 Negro natality increased at approximately 2.5 percent annually. Both the Negro and white birth rates, however, show an accelerated increase since the beginning of World War II, the Negro rate of increase since 1940 being less than the white.

Infant mortality since 1920 (fig. 2) has been approximately 65 percent higher for Negroes than whites in the birth registration States. Both Negro and white infant mortality declined from 1925 to 1935 at a rate of approximately 2.5 percent annually; since 1936 the decline in infant mortality has been accelerated to about 3.8 and 4.5 percent annually for Negroes and whites, respectively.

<sup>3</sup> Urban includes cities and towns of 2,500 or more population; rural, towns under 2,500 and rural areas.

<sup>4</sup> In the total United States 96 percent of the nonwhite population enumerated in 1940 was Negro and therefore rates for the entire country which are obtainable only for the nonwhite population will be referred to as Negro rates. The same applies to northern and southern sections of the country also, since the proportion of the nonwhite population that is Negro is 96 and 99 percent, respectively. Rates for separate geographic areas shown in figures 4, 5, 6 are computed specifically for Negroes.

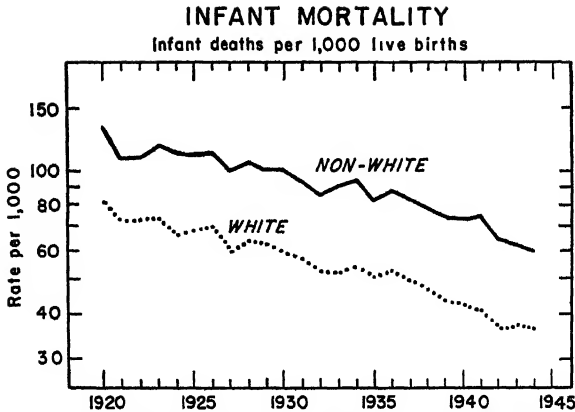


FIGURE 2.—Course of infant mortality in the expanding birth registration States, 1920-43. For table of rates see Vital Statistics Rates in the United States, 1900-1940, (4) page 578, and table 1 of this report.

Maternal mortality has decreased since 1920 (fig. 3) with a marked acceleration in the rate of decline after 1936 for both Negroes and whites. From 1928 to 1935 the annual rate of decline was roughly 2.5 percent for both races, the level of the Negro rate being somewhat less than twice the white. From 1936 to 1943 the rate of decline in maternal mortality has been approximately 7.0 percent for Negroes and 9.5 percent for whites.

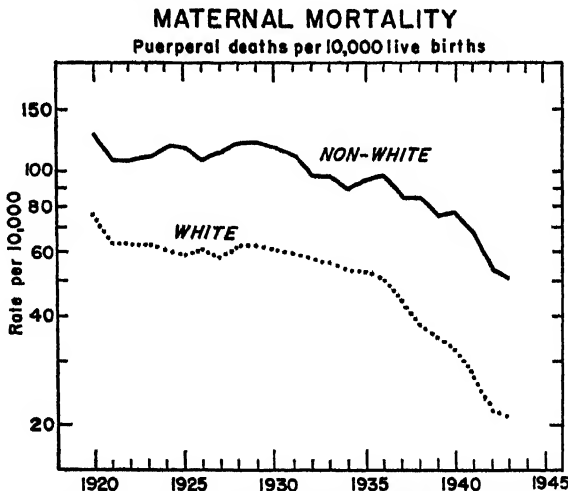


FIGURE 3.—Course of maternal mortality in the expanding birth registration States, 1920-43. For table of rates see Vital Statistics Rates in the United States, 1900-1940, (4) page 622, and table 1 of this report.

#### NATALITY AND MORTALITY IN GEOGRAPHIC SECTIONS

Figures 4, 5, and 6 show resident natality, infant mortality, and maternal mortality for Negro and white populations in nine geographic sections of the United States for an average of 3 years centering on 1940 for natality and on 1939 for infant and maternal mortality.

## BIRTHS PER 1,000 WOMEN 15-44 YEARS OF AGE

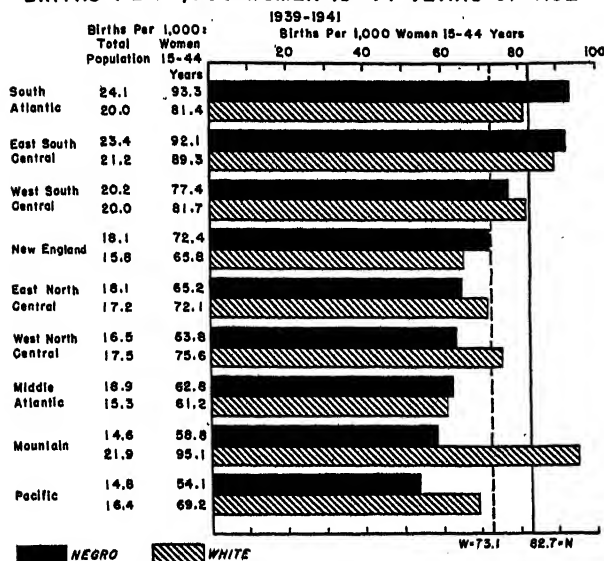


FIGURE 4.—The birth rate in nine geographic sections of the United States (5).

The southern sections have high birth rates for both Negroes and whites (fig. 4). Among the northern sections the New England region has a relatively high birth rate for both races. Negroes in the Mountain and Pacific sections have comparatively low birth rates, whereas for whites in the same areas the rates are relatively high. A comparison of Negro and white birth rates in separate sections becomes clearer when the rates are specific for size-of-city as in the following section (fig. 7).

Infant mortality in the total United States,<sup>5</sup> 1938 to 1940, was 66 percent higher for Negroes than whites; the unweighted average of the rates for separate sections, however, is 53 percent higher for Negroes; and in specific sections, such as the South Central, Negro infant mortality is only about 35 percent higher than the white (fig. 5). Broadly speaking the array of geographic sections by rate of infant mortality is the same for Negro and white; the main exception is the high Negro rate in the West North Central area which may be due to the concentration of the Negro population in large cities in the southern part of the section. Southern sections have relatively high infant mortality; the Middle Atlantic, East North Central, New England, and Pacific sections have relatively low rates for both races.

<sup>5</sup> The mean rate for Negroes in the total United States is heavily weighted by the high rates in the South Atlantic and South Central sections; for whites by the low rates in the Middle Atlantic, North Central, New England, and Pacific sections. These are areas which comprise 77 and 70 percent of the total Negro and white populations, respectively.

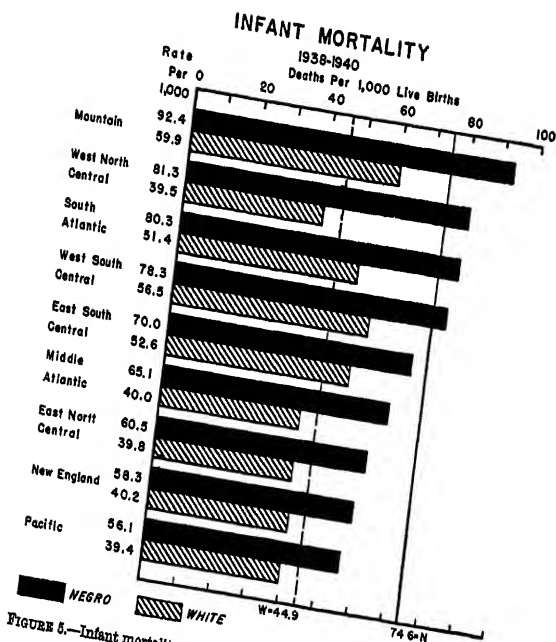


FIGURE 5.—Infant mortality in nine geographic sections of the United States (6).

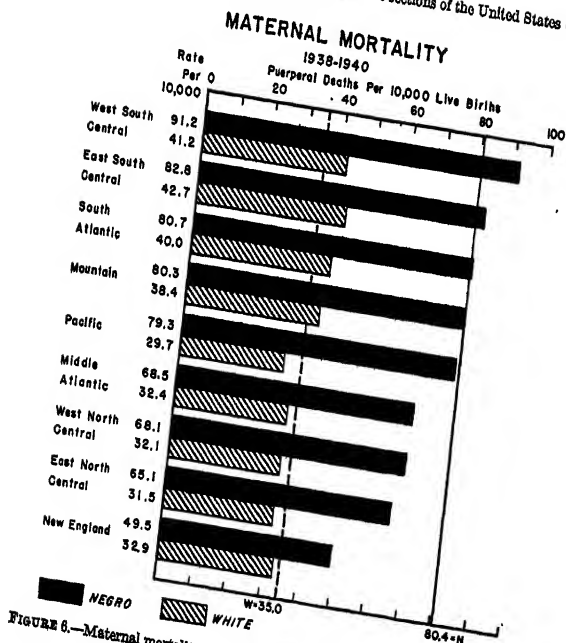


FIGURE 6.—Maternal mortality in nine geographic sections of the United States (6).

Maternal mortality, 1938 to 1940 (fig. 6), was 2.3 times as high for Negroes as whites in the total United States. The ratio for separate sections is fairly uniform, somewhat above 2.0, except in the Pacific section where the Negro rate is unusually high relative to the white, and in the New England region where the Negro and white rates are more nearly alike. The array of sections is practically the same for Negro and white; the southern sections again have the highest rates and New England the lowest.

#### NATALITY AND MORTALITY IN URBAN AND RURAL AREAS OF NORTH AND SOUTH

Figures 7, 8, and 9 give a comparison of the nonwhite birth rate, infant mortality, and maternal mortality with the white, specific for size-of-city and rural area in North and South. Births and deaths specific for size-of-city are obtainable only for the nonwhite population, but in the total of North and South the nonwhite population is almost entirely Negro so that the comparison of nonwhite with white is essentially a Negro and white comparison. The rates shown in figures 7, 8, and 9 are based on resident births and deaths for the year 1940. Resident births and deaths are practically essential for any urban and rural comparison, and with the dissimilar distribution of Negro and white populations between urban and rural areas of both North and South, resident deaths become even more necessary for a valid comparison.

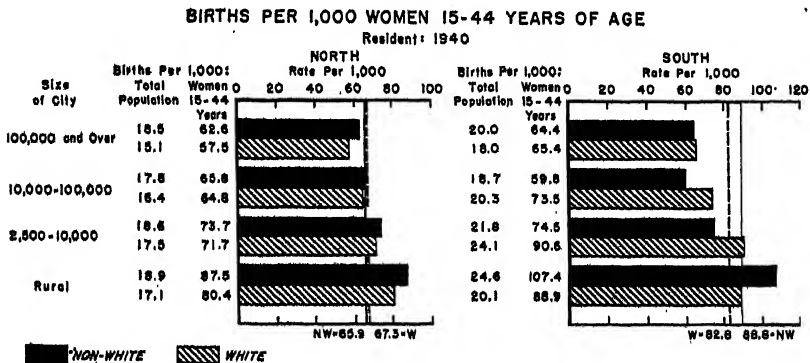


FIGURE 7.—The birth rate in North and South by size of city. North comprises the New England, Middle Atlantic, East North Central, and West North Central sections. South comprises the South Atlantic, East South Central, and West South Central sections.

In the North (fig. 7) the Negro birth rate is somewhat higher than the white in each size-of-city group, and increases as size-of-city decreases for both races. In the South, however, the Negro rate is lower than the white in all except rural areas, and in general increases for both races as size-of-city decreases. It is quite possible that

underregistration of births has appreciably lowered the rates in southern rural areas. Among southern whites the rural birth rate is slightly lower than in small towns but among southern Negroes the recorded rural rate is 44 percent higher than in small towns; it is not impossible, however, that the Negro rural birth rate would be even higher if corrected for incomplete registration. In comparing the rates for North and South, the white birth rate is distinctly higher in the South than in the North for each size-of-city group; the Negro birth rate specific for size-of-city, however, is practically the same in North and South except in rural areas, where the Negro birth rate is definitely higher in the South.<sup>6</sup>

In the North, Negro infant mortality (fig. 8) is higher, relative to the white, in rural areas than in large cities; and increases for both races as size-of-city decreases. In the South, Negro and white infant mortality in large cities are in about the same ratio as in the North, but in rural areas of the South the ratio of Negro to white infant

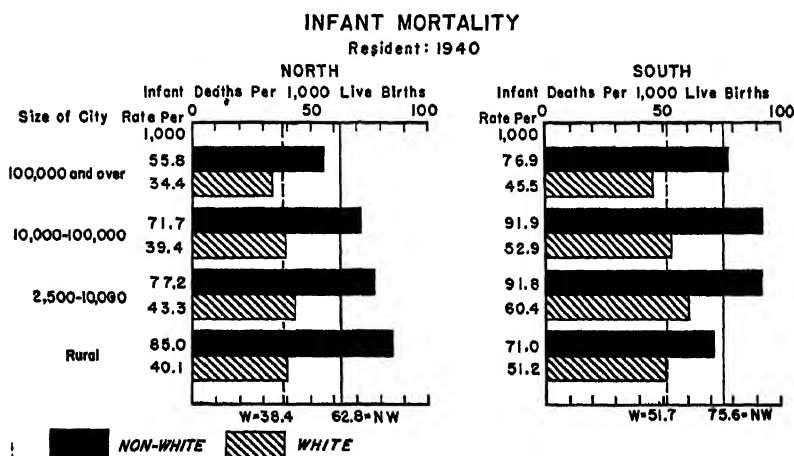


FIGURE 8.—Infant mortality in North and South by size of city. North comprises the New England, Middle Atlantic, East North Central, and West North Central sections. South comprises the South Atlantic, East South Central, and West South Central sections.

mortality is less than in the North because of the comparatively low rate for rural Negroes. Southern infant mortality is higher than northern for all groups except the rural Negro; in southern rural areas recorded Negro infant mortality drops below that in cities of the South and is about the same as in cities of 10,000 to 100,000 population in the North. Only in northern cities of 100,000 or more

<sup>6</sup> Figure 7 contains apparent inconsistencies in the total birth rate for nonwhite and white in both North and South that are caused by population weighting. In the North the nonwhite population is predominantly urban, while in the South it is rural. In the North, therefore, the total nonwhite rate is weighted unduly by the low rate in large cities and in the South by the high rate in rural areas, as compared with the white. The result is that in the North the total nonwhite rate is lower than the white although for each size-of-city group it is higher; and in the South the total nonwhite rate is higher than the white, although in all except rural areas it is lower.

population is the recorded Negro infant mortality rate lower than it is in southern rural areas.

Infant mortality is expressed, in figure 8, as infant deaths per thousand live births; underregistration of deaths, therefore, decreases and underregistration of births increases the rate, the two thus tending to counteract each other. The Bureau of the Census estimates a larger underregistration of births than deaths; and therefore the infant mortality rate, that is, infant deaths per 1,000 live births may be even too high as recorded.

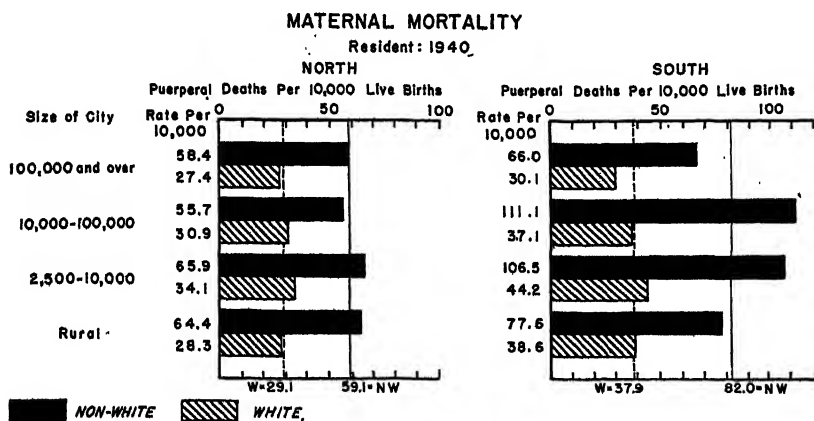


FIGURE 9.—Maternal mortality in North and South by size of city. *North* comprises the New England, Middle Atlantic, East North Central, and West North Central sections. *South* comprises the South Atlantic, East South Central, and West South Central sections.

Negro maternal mortality (fig. 9) in the North is higher relative to the white in rural areas than in towns or large cities, and increases slightly as size-of-city decreases. In the South the ratio of the Negro to the white rate is approximately the same as in the North for large cities and rural areas; in smaller cities and in towns, however, recorded Negro maternal mortality is exceptionally high, almost three times the recorded white rate. Maternal mortality is higher in the South than in the North, being relatively highest for small cities and towns where the Negro rate is exceptionally high.

#### SUMMARY

Negro natality (live births per 1,000 women 15 to 44 years of age), infant mortality (infants deaths per 1,000 live births) and maternal mortality (deaths from puerperal causes per 10,000 live births) have been presented for the birth registration States, 1920 to 1943 for nine geographic areas in 1940, and for urban and rural areas of North and South in 1940, compared in each instance with the white. Resident deaths make possible a comparison of natality and mortality specific for size-of-city in North and South.



From 1920 to 1936, natality, infant mortality, and maternal mortality were declining at approximately the same rate for Negro and white; since 1936 the birth rate has increased among both Negroes and whites; infant and maternal mortality have continued to decline to the present but at a more rapid rate since 1936 than prior to that year and with a greater acceleration in the recent decline for whites than Negroes.

The birth rate in 1940 was higher for Negro than white in all size-of-city groups in the North; but in the South the white rate is the higher except in rural areas. The birth rate tends to increase as size-of-city decreases. The Negro birth rate specific for size-of-city is about the same in North and South except in rural areas, where the southern rate is higher.

Negro infant mortality is higher than white in all groups; and, on the whole, increases as size-of-city decreases except in the South where the rural Negro rate is lower than the urban in any size-of-city group. Southern infant mortality is higher than northern except for the low rate among southern rural Negroes.

Maternal mortality is decidedly higher among Negroes than whites and higher in the South than in the North. Maternal mortality in the North increases slightly as size-of-city decreases; in the South the Negro rates in towns and small cities are exceptionally high.

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### THE REMOVAL OF THE CERCARIAE OF *SCHISTOSOMA MANSONI* FROM WATER BY FILTRATION THROUGH DIATOMACEOUS SILICA IN A SMALL MODEL FILTER <sup>1</sup>

By MYRNA F. JONES, *Zoologist*, and FREDERICK J. BRADY, *Surgeon, United States Public Health Service*

The probable use of diatomaceous silica filters by the armed forces in areas where schistosomiasis is endemic made it imperative to determine the efficiency of this type of equipment for the removal of schistosome cercariae from water supplies. Studies (1), (2) have shown

<sup>1</sup>From the Zoology Laboratory, National Institute of Health. (Assigned date of publication in PUBLIC HEALTH REPORTS, October 6, 1944, but withheld for security reasons.)

that cercariae are able to pass sand filters in considerable numbers. In fact, Leiper (1) found them to penetrate through 30 inches of "sand of the finest grain used by the Cairo [Egypt] water works." Diatomaceous silica filters were found to be considerably more efficient than sand filters operated at the rates required by the Army in the removal of cysts of *Endamoeba histolytica* (3).

A small model filter for use with diatomaceous silica was provided for these experiments through the courtesy of Capt. Hayse H. Black, Chief, Water Supply and Equipment Branch, Engineer Board, Fort Belvoir, Va. This filter (fig. 1) consisted of a glass cylinder of about 700-ml. capacity mounted vertically with rubber gaskets and constructed to allow the interposition of a rigid porous cylinder, the diaphragm, between the influent at the bottom and the effluent at the top.

Diaphragms of two types were provided for use in this study. The aloxite diaphragm<sup>2</sup> had a 30-grade porosity and the carbon diaphragm<sup>3</sup> had a 60-grade porosity. Only diaphragms of 1-inch lengths were used and each had a surface area of slightly over 5.5 square inches.

Water was circulated through the equipment by the use of an electrically driven centrifugal pump<sup>4</sup> and the rate of pumping was governed by a rheostat connected to the electric motor.

Two Kelly flasks were used to add water, suspensions of diatomaceous silica, and suspensions of cercariae to the unit. A pressure gage was placed between the pump and the filter unit proper.

Three types of diatomaceous silica were used. Dicalite 4200 is the coarsest grade marketed by the Dicalite Co. and its use would be presumed to be a critical test of this type of filtering medium. Dicalite Speedplus was used because this may be recommended as the grade most useful in water sterilization. Sorbo-Cel 503,<sup>5</sup> a chemically treated silica, was used because such treatment of the material is supposed to increase its filtering efficiency.

In the operation of the filter, water was added to the equipment in sufficient quantity to fill the glass filter chamber and a weighed amount of diatomaceous silica was added to a Kelly flask to permit filtration through the recommended amount of 0.15 pounds per square foot of filtering area. The motor was started and the air vented from the top of the glass filter chamber. The filtered water was returned to the Kelly flask until such time as most of the diatomaceous silica was deposited on the diaphragm. The effluent hose was now removed from the Kelly flask and placed in the collecting flask. Either the cercarial suspension or water could be added at will to a Kelly flask, depending upon the plan of the experiment.

The cercariae were shed by laboratory-infected snails, *Australorbis*

<sup>1</sup> Manufactured by the Carborundum Co.

<sup>2</sup> Manufactured by the National Carbon Co.  
Models B and E of the Eastern Engineering Co.

<sup>3</sup> Johns-Manville Special Sorbo-Cel 503.

*glabratus*, and were from a Puerto Rican strain of *Schistosoma mansoni*. In most experiments, the cercariae had been shed during the previous 24 hours, although in some experiments active cercariae collected over a 48-hour period were used. The cercarial suspension usually contained a small amount of snail feces and even small particles of lettuce upon which the snails fed.

Estimates of the numbers of cercariae were made by counting those found in the bottom of a container holding either an aliquot portion or the whole sample after killing with alcohol or mercuric chloride. Counts were made under a dissecting microscope.

Either tap water or raw river water was used throughout as the diluent medium. In one instance, kaolin was added to the water in order to increase the pressure on the filter through a mechanical plugging action.

#### RESULTS OF TESTS

One experiment was performed to determine the efficiency of the technique of recovery of the cercariae. In this experiment, the filter housing alone was used without the addition of either the diaphragm or diatomaceous silica. About 14,000 cercariae were added to the equipment and, by counting the number in three 10-ml. aliquot samples, it was estimated that over 10,000 cercariae were recovered in the effluent. By estimation from a single 100-ml. aliquot sample, a similar figure was obtained. After operation, 830 ml. of water remained in the filter housing. An estimate from two 10-ml. aliquot samples of this gave over 900 cercariae while a similar estimate on one 100-ml. sample gave over 800 cercariae. These latter numbers represent cercariae that never reached the effluent tubing and presumably could not be expected to reach the effluent in later experiments unless much larger quantities of water were filtered. Discounting these cercariae, approximately 75 percent of the added cercariae were recovered.

Four experiments were performed to determine the efficiency of the diaphragms in removing the cercariae without the addition of diatomaceous silica. These data are presented in table 1. It will be seen that no cercariae were recovered in one test with the carbon diaphragm while about 1 percent of the cercariae were recovered in a second test. In the tests using the aloxite diaphragm, about 3 and 4 percent, respectively, of the applied cercariae were recovered in the effluent. It will be noted that the numbers of recovered cercariae increased with the duration of the filtration, probably because of a lag in the cercariae finding their way through the tortuous porous openings.

Nine experiments were performed to determine whether the cercariae could penetrate the coating of diatomaceous silica after its application to the diaphragm. The data are presented in table 2. In spite of the use of varying flow rates and pressures, two types of

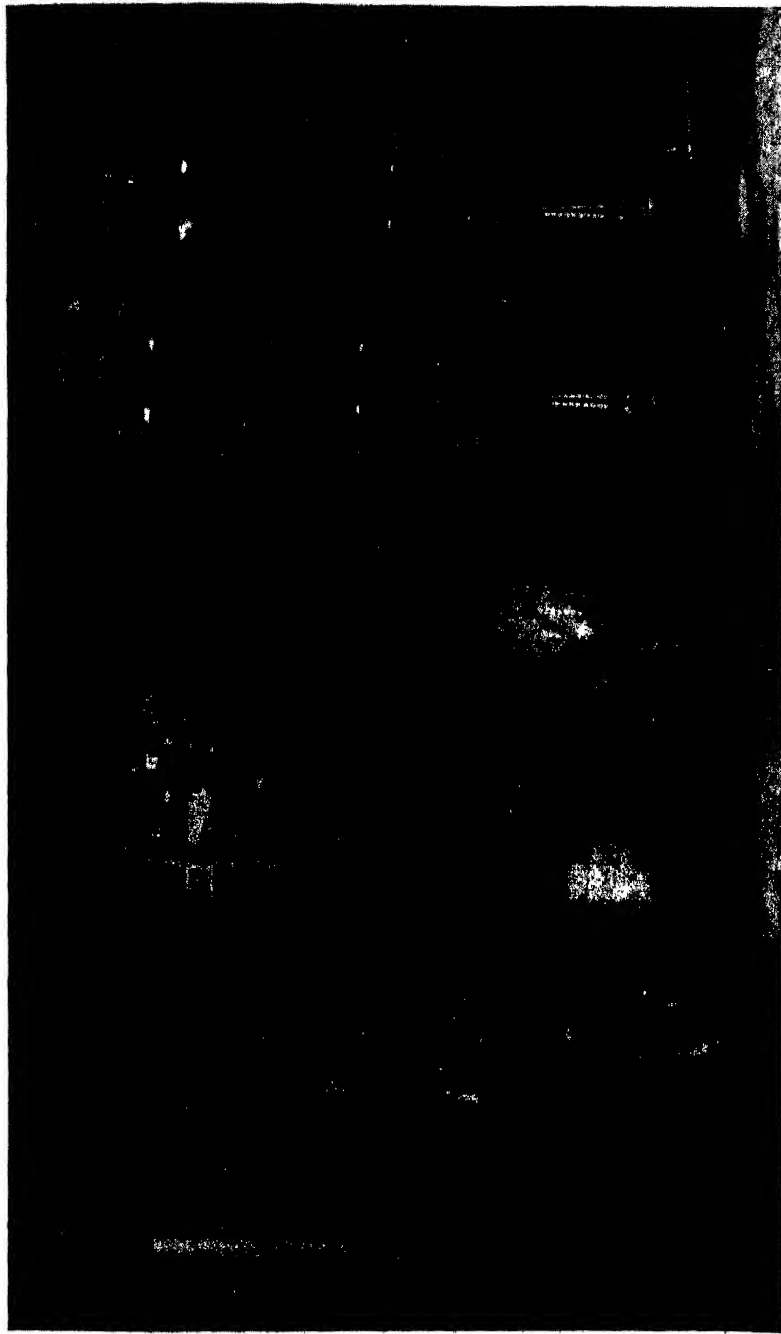


FIGURE 1.—Model diatomaceous silica filter.



TABLE 1.—*The recovery of cercariae of Schistosoma mansoni after passing a suspension through a model diatomaceous silica filter operated with a diaphragm but without the silica*

Date	Type of diaphragm	Rate of filtration (gal./ft. <sup>2</sup> /min.)		Pressure (lbs./in. <sup>2</sup> )		Filtering time		Amount of effluent (ml.)	Number applied cercariae	Cercariae recovered in effluent
		Maximum	Minimum	Maximum	Minimum	Minutes	Seconds			
Dec. 27, 1943	Carbon.....	4.8	3.6	2	0	8	10	2,000	22,500	0.
Jan. 25, 1944	.....do.....	16.0	7.9	2.5	0	3	38	6,000	7,000	(1st 2,000 ml.-3. 2d 2,000 ml.-20. 3d 2,000 ml.-39.
Dec. 18, 1943	Aloxite.....	5.4	5.4	0	0	2	30	2,000	5,000	180+.
Dec. 29, 1943	.....do.....			0	0			2,000	9,700	(1st liter-0. 2d liter-400.

TABLE 2.—*The recovery of cercariae of Schistosoma mansoni after passing a suspension through a model diatomaceous silica filter*

Date	Type of diaphragm	Type of diatomaceous silica	Rate of filtration (gal./ft. <sup>2</sup> /min.)		Pressure (lbs./in. <sup>2</sup> )		Filtering time		Amount of effluent (ml.)	Number cercariae applied	Number cercariae in effluent
			Maximum	Minimum	Maximum	Minimum	Minutes	Seconds			
1943											
Dec. 22	Carbon.....	(Special Sorbo-Cel 503	3.7	1.8	3	1	5	30	2,000	8,400	0
Dec. 23	.....do.....	Speedplus.....	6.7		3.5	0	6	17	2,000	7,800	0
Dec. 21	Aloxite.....	(Special Sorbo-Cel 503	5	2.5	2		4	12	2,000	5,415	0
Dec. 18	.....do.....	Speedplus.....	3.6	1.5	3	0	6	30	2,000	5,040	0
Dec. 17	.....do.....	.....do.....	2.3	0.9	3	0	27	0	2,000	8,500	0
1944											
Jan. 7	.....do.....	4200.....	1.7	1	0	0	10	15	2,000	7,700	0
Jan. 12	.....do.....	4200.....	1.2		13	10	3	26	2,000		0
Jan. 13	.....do.....	4200.....	11.1	4.3	10	1	6	4	775	9,050	0
Jan. 14	.....do.....	4200.....	1.5	0.3	9	2.5	7	0	6,000	4,400	0
					17	6	19	50	2,900	10,800	0

<sup>1</sup> Kaolin added in an equal amount.

diaphragms, and three types of diatomaceous silica, it will be noted that there were no cercariae recovered in any of the samples examined. The samples were felt to be of adequate size to lend validity to the results of the experiment in spite of losses due to technique.

Three experiments were performed with an aloxite diaphragm to determine the numbers of cercariae that could be found in the effluent when a contaminated water was used for the precoating process. The data are presented in table 3. The first and third experiments were not continued long enough for the effluent samples to become free of cercariae. However, during the precoating operation in the second experiment, cercariae were found in the recirculating water for a period of 12 minutes. It is noteworthy that the effluent appeared to be free from visible turbidity within 1 minute after recirculation had started. In an experiment performed without cercariae but with a

TABLE 3.—The recovery of cercariae of *Schistosoma mansoni* during precoating and filtration of a cercarial suspension in a model diatomaceous silica filter

Date	Num ber cer- ariae applied	Precoating						Filtration									
		Elapsed time (min.)	Pressure (lbs./in. <sup>2</sup> )		Rate of fil- tration (gal./ft. <sup>2</sup> /min.)		Time of sample (min.)	Size of sample (ml.)	Number cerariae recov- ered in sample	Elapsed time (min.)	Pressure (lbs./in. <sup>2</sup> )		Rate of fil- tration (gal./ft. <sup>2</sup> /min.)		Time of sample (min.)	Size of sample (ml.)	Number cerariae recov- ered in sample
			Maxi- mum	Mini- mum	Maxi- mum	Mini- mum					Maxi- mum	Mini- mum	Maxi- mum	Mini- mum			
Dec. 30, 1943.	4, 200	0-8	3	2	2	2	2	100	5	8-17	2.5	3	1.8	1.4	{ 8 17	2,000 1,000	8 3
Jan. 21, 1944.	5, 100	0-15	13	0	0.8	0.8	{ 1 2 3 5 7 9 12 15	100 100 100 100 100 100 100 100	{ 2 4 5 1 2 1 1 0	15-32	19	18	2.6	2.4	{ 17 20 30	1,000 1,000 1,000	0 0 0
Feb. 28, 1944.	27, 500	0-10	13	9	1.8	1.8	{ 1 3 5 7 8 9 10	100 100 100 100 100 100 100	{ 352 65 20 6 1 2 1	10-35	14	14	1.9	1.7	{ 10 12 14	1,000 1,000 1,000	8 6 5

raw water with a turbidity of 133 p. p. m., the effluent was free of visible turbidity in 1 minute of operation.

#### DISCUSSION

These experiments demonstrate the efficiency of diatomaceous silica for removing the cercariae of *Schistosoma mansoni*. In the case of sand filters, the interstices between the grains of sand are relatively large, and this circumstance combined with the active movements of cercariae permits the passage of these organisms. With the diatomaceous silica, the pores between the individual particles are small and, because of their irregular shapes, the particles are compressed into a tight mass. Both of these factors operate to keep the cercariae from passing the filter.

It must be noted, however, that a high degree of contamination of the diaphragm and effluent tubing occurs when the cercarial suspension is used in the precoating process. To safeguard against this contamination, effluent waters should be discarded for a period after the effluent becomes visibly clear. The length of this interval would depend on a number of factors such as rate and pressure of flow, thickness of diaphragm, and length of effluent tubing. No attempt was made to evaluate this time factor because generalizations made on the basis of this experimental equipment would not be applicable to units of a different design.

#### SUMMARY

Tests were made to determine the efficiency of a small model diatomaceous silica filter in the removal of the cercariae of *Schistosoma mansoni* from raw water. Cercariae added to the precoating solution were found to be present in the water passing the filter for as long as 12 minutes after the beginning of recirculation even though the filtered water appeared to be visibly free from turbidity within 1 minute after the beginning of recirculation.

When the cercariae were added to the influent water after the diatomaceous silica had been deposited on the diaphragm, none was recovered in the effluent in any of nine experiments in spite of the use of three grades of diatomaceous silica, the use of low and high pressures, and the use of slow and rapid filtration rates.

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- (3) Lowe, Harry N., Jr.; Brady, Frederick J.; Jones, Myrna F.; Wright, Willard H.; and Black, Hayse H.: Report 834, Efficiency of Standard Army Water Purification Equipment and of Diatomite Filters in Removing Cysts of *Endamoeba histolytica* from Water (Restricted) War Department (July 8, 1944).



## CHANGES IN STATE AND TERRITORIAL HEALTH AUTHORITIES

**Change No. 2 to Directory of State and Territorial Health Authorities (Supplement No. 180 to the Public Health Reports—1945 Revision)**

The following changes have been received since compilation of Change No. 1.<sup>1</sup> Notice of further changes should be addressed to the Records and Reports Unit, Bureau of State Services, United States Public Health Service, Washington 25, D. C.

### ALABAMA STATE DEPARTMENT OF HEALTH

**Douglas L. Cannon, M. D., M. P. H.,**  
Assistant State Health Officer

#### Cancer services:

**D. G. Gill, M. D., D. P. H.,** acting director  
Division of Cancer Control.

#### Industrial hygiene:

**A. T. Rossano,** acting director  
Division of Industrial Hygiene.

#### Sanitation activities:

Rodent control and control of garbage collection and disposal—  
**G. R. Wright,** director  
Division of Typhus Fever Control.  
Sanitation of bathing places—  
**T. H. Milford,** director  
Bureau of Sanitation.

#### Tuberculosis control:

**N. H. DeJanney, M. D.,** acting director  
Division of Tuberculosis Control.

#### Vital records:

**Ralph Roberts,** director  
Bureau of Vital Statistics.

#### Miscellaneous activities:

Machine tabulation—  
**W. C. Wilson,** director  
Division of Machine Tabulation.

### ALASKA TERRITORIAL DEPARTMENT OF HEALTH

#### Public health education:

**Mary Hurley, M. P. H.,** consultant  
Health Education Unit.

#### Tuberculosis control:

**Leo J. Gehrig,** Assistant Surgeon  
United States Public Health Service  
Division of Communicable Disease Control.

#### Miscellaneous activities:

Motor vessel hygiene—

**Georgia N. Krusich, M. D.,** physician in charge

Marine Health Unit.

### ARIZONA STATE DEPARTMENT OF HEALTH

#### Vital records:

**Mary Davidson,** deputy State registrar  
Division of Vital Statistics.

### CALIFORNIA STATE DEPARTMENT OF HEALTH

Communicable disease control, general:  
**Raymond Kaiser, M. D.,** chief  
Bureau of Acute Communicable Diseases.

### CONNECTICUT STATE DEPARTMENT OF HEALTH

#### Public health education:

**Chester S. Bowers,** acting director  
Bureau of Public Health Education.

### FLORIDA STATE DEPARTMENT OF HEALTH

#### Administration, general:

Accounting and financing—  
**Fred B. Ragland,** director  
Bureau of Finance and Accounts.

#### Laboratory services:

**Albert V. Hardy, M. D.,** director  
Bureau of Laboratories.

#### Nutrition:

**Walter Wilkins, M. D.,** director  
Nutrition Investigations and Services.

### GEORGIA STATE DEPARTMENT OF HEALTH

#### Public health nursing:

**Theodora Floyd, R. N.,** director  
Division of Public Health Nursing.

<sup>1</sup> Change No. 1 appeared in PUBLIC HEALTH REPORTS, 61:1386-1387 (Sept. 20, 1946).

**HAWAII STATE DEPARTMENT OF HEALTH****Sanitation activities:**

Rodent control and control of garbage collection and disposal—  
**Bertram Gross**, acting director  
 Division of Rodent Control.

**IDAHO STATE DEPARTMENT OF HEALTH****Administration, general:**

Accounting and financing—  
**J. R. Burkhard**, accountant

**Cancer services:**

**L. J. Peterson, M. P. H.**, acting administrative director  
 Central Administration.

**Public health nursing:**

**Florence Whipple, R. N.**, director  
 Division of Public Health Nursing.

**Sanitation activities:**

Milk sanitation—  
**W. R. McLean**, State milk sanitarian  
 Division of Public Health Engineering.

**INDIANA STATE DEPARTMENT OF HEALTH****Dental services:**

**Charles L. Howell, D. D. S.**, director  
 Division of Dental Health.

**Nutrition:**

**Robert Yoho**, director  
 Division of Health and Physical Education.

**Tuberculosis control:**

**Carl C. Kuehn, M. D.**, director  
 Division of Tuberculosis Control.

**Miscellaneous activities:**

Public health statistics—  
**Robert E. Serfling**, director  
 Division of Public Health Statistics.

**Hospital service—**

**Martha O'Malley, M. D.**, director  
 Division of Hospital and Institutional Services.

**Standards, weights, and measures—**

**W. Forrest Moore**, director  
 Division of Weights and Measures.

**IOWA STATE DEPARTMENT OF HEALTH****Industrial hygiene:**

**Nunzio J. Carrozzo, M. D.**, acting medical director  
 Division of Industrial Hygiene.

**Venereal disease control:**

**R. M. Sorensen, M. D., M. P. H.**, director  
 Division of Venereal Disease Control.

**MAINE STATE DEPARTMENT OF HEALTH****Nutrition:**

**Ella Langer, M. D.**, director  
 Division of Maternal and Child Health.

**Sanitation activities (all):**

**Elmer W. Campbell, D. P. H.**, director  
 Division of Sanitary Engineering.

**MASSACHUSETTS STATE DEPARTMENT OF HEALTH****Dental services:**

**A. L. Corbman**, acting director  
 Division of Dental Health.

**MISSISSIPPI STATE DEPARTMENT OF HEALTH****Public health education:**

**Cassie B. Smith**, supervisor of health education  
 Division of Health Education.

**Venereal disease control:**

**W. G. Hollister, M. D.**, supervisor  
 Venereal Disease Control Unit.

**NEBRASKA STATE DEPARTMENT OF HEALTH****Communicable disease control, general:**

**Fred P. Long, M. D.**, director  
 Division of Communicable Disease Control.

**NEVADA STATE DEPARTMENT OF HEALTH****Administration, general:**

Accounting and financing—  
**Leah Giometti**, fiscal officer

**Communicable disease control, general:**

**Harold W. Bischoff, M. D.**, director  
 Division of Epidemiology and Local Health Administration.

**Local health administration:**

**Harold W. Bischoff, M. D.**, director  
 Division of Epidemiology and Local Health Administration.

**Tuberculosis control:**

**Harold W. Bischoff, M. D.**, director  
 Division of Epidemiology and Local Health Administration.

**NEW YORK STATE DEPARTMENT OF HEALTH****Sanitation activities:**

Garbage collection and disposal, and  
 Housing control—  
**Albert Howd**, associate sanitary engineer  
 Division of Sanitation.

**NORTH DAKOTA STATE DEPARTMENT OF HEALTH**

**William M. Smith, M. D., M. P. H.,**  
Acting State Health Officer

## Administration, general:

Accounting and financing, and  
Personnel administration—

**William M. Smith, M. D., M. P. H.**

## Local health administration:

**William M. Smith, M. D., M. P. H.**  
Division of Administration.

**OREGON STATE DEPARTMENT OF HEALTH**

## Local health administration:

**R. H. Wilcox, M. D., M. P. H.,**  
director

Division of County Health Units.

## Malaria and mosquito control:

**Curtis M. Everts, Jr.,** chief  
Engineering Section.

## Maternity, infant, and child (preschool) health services:

**Maynard C. Shiffer, M. D.,** director  
Maternal and Child Health Section.

## Preventive medical services:

-----, director  
Division of Preventive Medical Service.

## Public health nursing:

**A. Dyer, R. N., M. P. H.,** State public health nurse  
Public Health Nursing Section.

## Sanitation activities:

General sanitation—  
Rodent control and control of garbage collection and disposal—  
Shellfish sanitation—  
**Curtis M. Everts, Jr.,** chief  
Engineering Section.

**PENNSYLVANIA STATE DEPARTMENT OF HEALTH**

## Local health administration:

**J. Moore Campbell, M. D.,** deputy secretary of health  
Bureau of Health Conservation.

## Sanitation activities:

Food sanitation—  
**Eugene Elgin, M. D.,** epidemiologist  
Division of Epidemiology.  
Sanitation of hotels and camps—  
**F. B. Watkins**  
Bureau of Sanitary Engineering.

**PUERTO RICO DEPARTMENT OF HEALTH**

## Cancer services:

**A. Acosta Velarde, M. D.,** director  
Division of Hospitals.

## Local health administration:

**Ramon A. Rios, M. D.,** assistant director  
Division of Public Health.

## Public health education:

**Catalina Lube, M. P. H.,** chief  
Section of Public Health Education.

## Sanitation activities:

Rodent control and control of garbage collection and disposal—  
**Jose A. Seraballs, M. P. H.,** chief  
Municipal Sanitation Section.

## Miscellaneous activities:

Medical care, general—  
**J. Alum, M. D.,** director  
Division of Public Health.

**RHODE ISLAND STATE DEPARTMENT OF HEALTH**

## Sanitation activities:

Food sanitation—  
**Chas. E. Hopkins,** food and drug inspector  
Food Section.  
**James J. Dillon,** senior sanitary engineer  
Sanitary Inspection Section.

## Shellfish sanitation—

**James J. Dillon,** senior sanitary engineer  
Sanitary Inspection Section.

## Miscellaneous activities:

Recreational safety—  
**Frank M. Moody,** acting recreational safety inspector  
Bureau of Recreational Safety.

## Hairdressing board—

**May Gillogly,** hairdressing examiner.

**TENNESSEE STATE DEPARTMENT OF HEALTH**

## Miscellaneous activities:

**Ruth R. Puffer, D. P. H.,** director  
Statistical Service.

**UTAH STATE DEPARTMENT OF HEALTH**

## Communicable disease control, general:

**A. A. Jenkins, M. D. C. P. H.,** director  
Division of Communicable Disease Control.

## Sanitation activities (all):

**Lynn M. Thatcher**, director  
Division of Public Health Engineering and Sanitation.

## VIRGINIA STATE DEPARTMENT OF HEALTH

**L. J. Roper** M. D., State Health Commissioner.

## Administration, general:

**L. J. Roper**, M. D., State Health Commissioner.

## Communicable disease control, general:

**Benjamin R. Allen**, M. D., director  
Bureau of Communicable Diseases.

## Tuberculosis control:

## Hospital services—

**L. J. Roper**, M. D., director  
State Tuberculosis Sanatoria.

## WEST VIRGINIA STATE DEPARTMENT OF HEALTH

**N. H. Dyer**, M. D., State Health Commissioner.

## WYOMING STATE DEPARTMENT OF HEALTH

## Sanitation activities:

Sanitation of water supplies and sewerage systems—

**L. O. Williams**, director  
Division of Public Health Engineering and Sanitation.

## DEATHS DURING WEEK ENDED SEPTEMBER 28, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 28, 1946	Correspond- ing week, 1945
Data for 91 large cities of the United States:		
Total deaths.....	8,074	8,271
Average for 3 prior years.....	8,189	
Total deaths, first 39 weeks of year.....	349,587	345,612
Deaths under 1 year of age.....	725	642
Average for 3 prior years.....	624	
Deaths under 1 year of age, first 39 weeks of year.....	24,703	23,385
Data from industrial insurance companies:		
Policies in force.....	67,293,986	67,307,275
Number of death claims.....	11,199	12,511
Death claims per 1,000 policies in force, annual rate.....	8.7	9.7
Deaths claims per 1,000 policies, first 39 weeks of year, annual rate.....	9.6	10.2

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED OCTOBER 5, 1946

#### Summary

A decrease in the incidence of poliomyelitis was recorded for the seventh consecutive week, a decline being reported in all of the nine geographic divisions except New England. A total of 1,142 cases was reported, as compared with 1,296 last week, 877 for the corresponding week in 1944, and a 5-year (1941-45) median of 515. Of 34 States reporting 5 or more cases, 3 recorded no change, 14 an increase (364 to 433), while a decrease (785 to 591) occurred in the other 17 States. Only 6 States reporting currently more than 12 cases showed increases, as follows (last week's figures in parentheses): Massachusetts 33 (28), Illinois 142 (131), Minnesota 97 (96), South Dakota 18 (6), Nebraska 51 (34), Washington 29 (27).

The total for the year to date is 19,640, as compared with 10,296, 15,423, and 9,824, respectively, for the same periods of 1945, 1944, and 1943, and a 5-year median of 9,824. For the 19-week period since May 25, a total of 18,751 cases has been reported, as compared with 9,556 in 1945, 14,924 in 1944, and 9,277 in 1943.

Of the total of 351 cases of diphtheria (less than for the corresponding week of any of the past 5 years) as compared with 313 last week and a 5-year median of 514, 47 (including delayed reports) were reported in Washington (last week 5), 24 each in Massachusetts and Ohio, 22 in Texas, and 21 in North Carolina. The cumulative total is 11,787, as compared with 11,263 for the same period last year and 9,924 for the 5-year median. Cumulative figures for certain States showing considerable variation from last year's figures are as follows (figures for the corresponding period of last year in parentheses): *Increases*—Massachusetts 244 (168), New York 749 (478), Pennsylvania 569 (326), Ohio 691 (310), Illinois 417 (137), Minnesota 271 (189), Maryland 480 (326), Virginia 376 (255), Florida 247 (158); *decreases*—North Dakota 51 (105), Nebraska 60 (101), North Carolina 446 (648), South Carolina 198 (381), Georgia 213 (343), Tennessee 227 (315), Alabama 242 (417), Mississippi 280 (377), Texas 1,239 (1,646), Oregon 130 (218), California 857 (951).

Deaths recorded for the week in 93 large cities of the United States totaled 8,503, as compared with 8,186 last week, 8,316 and 8,290, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,331. The total for the year to date is 362,522, as compared with 358,242 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Oct. 5, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Oct. 5, 1946	Oct. 6, 1945		Oct. 5, 1946	Oct. 6, 1945		Oct. 5, 1946	Oct. 6, 1945		Oct. 5, 1946	Oct. 6, 1945	
NEW ENGLAND												
Maine.....	0	1	0	—	—	—	108	4	6	3	0	0
New Hampshire.....	0	0	0	—	—	—	5	—	—	0	0	0
Vermont.....	0	1	0	—	—	—	28	1	1	0	1	0
Massachusetts.....	24	8	4	—	—	—	96	82	53	2	1	3
Rhode Island.....	2	0	0	—	8	—	—	—	1	0	0	0
Connecticut.....	1	0	0	1	—	1	10	5	5	2	0	2
MIDDLE ATLANTIC												
New York.....	13	3	9	13	15	15	77	20	48	6	8	12
New Jersey.....	1	0	1	3	3	4	14	14	24	2	3	3
Pennsylvania.....	14	12	6	1	1	1	122	81	60	5	3	4
EAST NORTH CENTRAL												
Ohio.....	24	21	18	6	3	4	40	9	18	5	3	3
Indiana.....	9	9	9	11	15	15	7	6	5	4	4	4
Illinois.....	6	6	10	2	1	6	11	49	19	4	13	8
Michigan <sup>1</sup> .....	4	9	8	1	—	—	6	60	30	5	2	2
Wisconsin.....	3	0	0	—	23	23	38	17	39	0	2	2
WEST NORTH CENTRAL												
Minnesota.....	3	5	5	—	—	—	—	3	4	0	1	1
Iowa.....	5	2	4	—	—	—	1	2	5	2	2	1
Missouri.....	1	5	3	—	2	2	—	5	5	2	3	3
North Dakota.....	1	1	2	10	8	5	—	—	0	0	0	0
South Dakota.....	0	0	3	—	—	—	—	2	2	0	0	0
Nebraska.....	0	0	1	5	—	—	3	3	3	1	0	0
Kansas.....	7	6	3	2	1	2	3	5	5	2	1	1
SOUTH ATLANTIC												
Delaware.....	0	1	1	—	—	—	—	—	—	0	0	0
Maryland <sup>1</sup> .....	10	19	11	5	—	—	5	1	4	2	0	3
District of Columbia.....	0	0	0	—	—	—	5	1	1	0	0	0
Virginia.....	18	19	19	149	153	107	14	3	12	5	3	3
West Virginia.....	8	14	10	1	—	—	15	—	4	0	4	1
North Carolina.....	21	68	68	—	—	2	35	6	6	1	2	1
South Carolina.....	0	24	25	22	177	177	—	3	7	0	3	1
Georgia.....	10	30	31	2	4	12	8	3	3	2	1	1
Florida.....	9	7	10	4	1	1	5	—	2	0	1	0
EAST SOUTH CENTRAL												
Kentucky.....	14	8	12	—	1	1	4	9	3	2	2	1
Tennessee.....	9	32	10	2	—	5	8	3	6	2	3	1
Alabama.....	8	30	30	13	21	21	5	1	3	0	1	1
Mississippi <sup>1</sup> .....	12	28	23	—	—	—	—	—	—	1	1	1
WEST SOUTH CENTRAL												
Arkansas.....	6	12	12	9	6	22	1	3	3	0	1	0
Louisiana.....	1	10	9	1	4	4	2	1	1	0	3	1
Oklahoma.....	7	8	10	37	13	22	1	10	3	0	0	0
Texas.....	22	59	53	823	499	499	25	22	15	2	8	7
MOUNTAIN												
Montana.....	0	4	2	—	13	2	20	45	6	0	0	0
Idaho.....	5	2	0	22	9	5	5	73	2	0	0	0
Wyoming.....	0	1	1	9	—	—	—	—	2	0	0	0
Colorado.....	5	11	8	50	12	15	4	4	7	0	0	0
New Mexico.....	3	3	1	—	—	—	12	1	1	0	0	0
Arizona.....	4	1	1	18	23	38	14	—	3	0	0	0
Utah <sup>1</sup> .....	0	0	0	3	—	—	14	4	5	0	0	0
Nevada.....	0	0	0	—	1	1	—	—	—	0	0	0
PACIFIC												
Washington.....	* 47	4	5	—	—	—	19	40	28	1	1	1
Oregon.....	2	3	3	4	1	4	9	10	21	0	0	1
California.....	12	29	19	2	13	13	56	128	77	3	10	6
Total.....	351	514	514	1,221	1,021	1,080	850	787	821	66	91	91
40 weeks.....	11,787	11,288	9,324	197,065	77,205	87,071	643,081	105,474	544,415	4,865	6,770	6,770

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

\* Delayed reports included.

*Telegraphic morbidity reports from State health officers for the week ended Oct. 5, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.*

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Oct. 5, 1946	Oct. 6, 1945		Oct. 5, 1946	Oct. 6, 1945		Oct. 5, 1946	Oct. 6, 1945		Oct. 5, 1946	Oct. 6, 1945	
NEW ENGLAND												
Maine.....	3	3	2	32	26	13	0	0	0	1	0	0
New Hampshire.....	12	0	1	2	0	3	0	0	0	1	0	0
Vermont.....	2	3	2	0	3	3	0	0	0	0	0	0
Massachusetts.....	33	44	10	30	52	81	0	0	0	5	2	3
Rhode Island.....	10	0	0	3	3	3	0	0	0	0	0	0
Connecticut.....	6	6	10	12	11	11	0	0	0	0	4	1
MIDDLE ATLANTIC												
New York.....	86	80	80	108	105	105	0	0	0	1	7	10
New Jersey.....	10	34	22	15	23	38	0	0	0	4	4	3
Pennsylvania.....	10	41	41	55	78	89	0	0	0	2	7	14
EAST NORTH CENTRAL												
Ohio.....	44	27	27	121	141	141	0	0	0	2	6	6
Indiana.....	24	9	9	29	39	39	0	0	0	9	1	3
Illinois.....	142	60	35	39	66	79	0	0	0	4	1	5
Michigan <sup>1</sup> .....	54	8	16	71	65	65	0	0	0	0	2	3
Wisconsin.....	74	44	14	29	41	66	0	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota.....	97	17	17	18	13	38	0	0	0	0	0	0
Iowa.....	24	24	15	10	37	37	0	0	0	1	1	1
Missouri.....	65	12	9	13	11	22	0	0	0	3	2	6
North Dakota.....	10	0	1	6	6	5	0	0	0	0	0	0
South Dakota.....	18	3	1	4	5	8	0	0	0	0	0	0
Nebraska.....	51	10	6	5	7	7	0	1	0	1	0	0
Kansas.....	66	4	4	18	37	45	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware.....	1	1	1	5	3	3	0	0	0	1	1	0
Maryland <sup>1</sup> .....	5	9	9	7	45	30	0	0	0	2	1	3
District of Columbia.....	3	6	5	3	10	13	0	0	0	0	1	1
Virginia.....	3	14	10	45	70	44	0	0	0	2	4	4
West Virginia.....	2	3	2	26	37	62	0	0	0	1	3	6
North Carolina.....	8	6	7	27	59	77	0	0	0	2	2	4
South Carolina.....	0	5	3	3	11	11	0	0	0	0	2	5
Georgia.....	4	8	3	14	22	31	0	0	0	4	2	7
Florida.....	10	5	2	9	2	4	0	0	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky.....	3	4	4	15	32	32	0	0	0	4	9	9
Tennessee.....	6	18	7	19	37	38	0	0	0	3	11	9
Alabama.....	7	3	3	9	13	30	1	0	0	0	0	1
Mississippi <sup>1</sup> .....	4	4	3	5	13	13	0	1	0	0	8	7
WEST SOUTH CENTRAL												
Arkansas.....	14	2	3	3	11	11	0	0	0	0	7	3
Louisiana.....	11	6	1	2	6	3	0	0	0	0	3	6
Oklahoma.....	10	1	1	6	17	16	0	0	0	1	4	4
Texas.....	24	20	8	30	66	35	0	0	0	8	10	10
MOUNTAIN												
Montana.....	4	13	1	8	11	10	0	0	0	2	1	0
Idaho.....	2	0	0	7	11	11	1	0	0	1	0	1
Wyoming.....	4	1	0	0	0	1	0	0	0	0	0	0
Colorado.....	28	6	4	6	19	19	0	0	0	0	2	1
New Mexico.....	2	1	1	3	5	5	0	0	0	0	5	5
Arizona.....	6	2	2	4	9	5	0	0	0	0	0	2
Utah <sup>1</sup> .....	6	15	5	6	6	10	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	29	7	7	25	11	29	0	0	0	0	1	0
Oregon.....	5	7	8	15	13	14	0	0	0	2	4	0
California.....	100	43	23	97	165	113	0	0	0	5	4	4
Total.....	1,142	639	515	1,019	1,473	1,536	2	3	4	72	122	144
40 weeks.....	19,640	10,296	9,824	91,923	142,255	106,353	295	286	635	3,297	3,942	4,496

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 4; Illinois 2; Georgia 2; Oklahoma 1; California 1.

Telegraphic morbidity reports from State health officers for the week ended Oct. 5, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Oct. 5, 1946								
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever	
	Oct. 5, 1946	Oct. 6, 1945		Ame- bic	Bacil- lary	Un- spec- ified						
NEW ENGLAND												
Maine.....	7	13	13	—	—	—	—	—	—	—	1	
New Hampshire.....	—	15	—	—	—	—	—	—	—	—	—	
Vermont.....	6	9	20	—	—	—	—	—	—	—	2	
Massachusetts.....	97	124	124	—	—	—	—	—	—	1	—	
Rhode Island.....	8	9	22	—	—	—	—	—	—	—	—	
Connecticut.....	40	20	29	—	—	—	—	—	—	—	—	
MIDDLE ATLANTIC												
New York.....	132	217	262	7	5	—	1	1	—	3	7	
New Jersey.....	112	140	115	—	—	—	—	—	—	—	—	
Pennsylvania.....	127	137	137	1	—	—	—	—	—	—	5	
EAST NORTH CENTRAL												
Ohio.....	64	149	149	13	—	—	1	—	—	—	6	
Indiana.....	16	16	16	—	—	1	—	—	1	—	6	
Illinois.....	70	68	136	2	—	—	2	—	1	—	7	
Michigan <sup>1</sup> .....	208	135	136	—	1	—	—	—	—	—	—	
Wisconsin.....	144	38	151	—	—	—	—	—	—	—	5	
WEST NORTH CENTRAL												
Minnesota.....	11	10	25	2	—	—	—	—	—	—	1	
Iowa.....	9	1	7	2	—	—	1	—	—	—	39	
Missouri.....	15	12	12	—	—	—	—	—	—	—	—	
North Dakota.....	—	1	11	—	—	—	—	—	—	—	—	
South Dakota.....	—	2	2	—	—	—	1	—	—	—	—	
Nebraska.....	—	—	6	—	—	—	—	—	—	—	—	
Kansas.....	10	11	21	—	—	—	1	—	—	—	1	
SOUTH ATLANTIC												
Delaware.....	1	—	—	—	—	—	—	—	—	—	—	
Maryland <sup>1</sup> .....	19	36	67	—	—	—	—	1	—	—	1	
District of Columbia.....	10	15	15	—	—	—	—	—	—	—	—	
Virginia.....	21	26	24	—	—	46	—	2	1	—	3	
West Virginia.....	2	14	14	—	—	—	—	—	—	—	—	
North Carolina.....	68	54	70	—	—	—	—	1	—	2	1	
South Carolina.....	4	70	67	—	—	—	—	—	—	1	—	
Georgia.....	6	31	10	2	2	—	—	—	—	5	3	
Florida.....	12	5	11	3	—	—	—	—	—	7	1	
EAST SOUTH CENTRAL												
Kentucky.....	11	22	22	—	4	—	—	—	1	—	—	
Tennessee.....	18	27	26	1	—	—	—	—	3	2	1	
Alabama.....	13	14	15	—	—	—	—	—	—	4	2	
Mississippi <sup>1</sup> .....	—	—	—	—	—	—	—	—	—	3	1	
WEST SOUTH CENTRAL												
Arkansas.....	12	1	19	—	—	—	—	—	7	2	1	
Louisiana.....	—	2	—	—	—	—	—	—	—	2	1	
Oklahoma.....	2	1	4	1	1	—	—	—	—	—	—	
Texas.....	172	75	94	13	161	35	—	—	1	30	7	
MOUNTAIN												
Montana.....	11	20	20	—	—	—	—	—	—	—	—	
Idaho.....	5	4	—	—	—	—	—	—	—	—	2	
Wyoming.....	—	—	5	—	—	—	—	—	—	—	—	
Colorado.....	19	21	30	—	—	—	—	—	—	—	1	
New Mexico.....	2	2	2	—	1	—	1	—	—	—	—	
Arizona.....	10	14	9	—	—	18	—	—	—	—	—	
Utah <sup>1</sup> .....	4	12	12	—	—	—	—	—	2	—	—	
Nevada.....	—	—	—	—	—	—	—	—	—	—	—	
PACIFIC												
Washington.....	12	17	23	—	—	—	—	1	—	—	1	
Oregon.....	14	27	11	1	—	—	—	—	—	—	4	
California.....	65	170	154	2	3	—	2	—	—	1	6	
Total.....	1,589	1,807	2,306	50	178	101	9	6	17	63	116	
Same week, 1945.....	1,807	—	—	37	485	263	28	6	14	117	95	
Average, 1943-45.....	1,886	—	—	48	432	183	18	4	9	117	—	
40 weeks: 1946.....	77,464	—	—	2,246	12,769	5,281	506	535	734	2,739	3,948	
1945.....	99,343	—	—	1,469	20,556	8,997	511	443	603	3,791	8,702	
Average, 1943-45.....	108,139	—	141,736	1,504	17,128	7,467	588	448	573	3,199	—	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

Leprosy: Florida 1 case.



## WEEKLY REPORTS FROM CITIES

City reports for week ended Sept. 28, 1946

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State and City	Diphtheria cases	Enecephalitis, in- fectious, cases	Influenza		Measles cases	Meningitis, me- ningococcus, cases	Pneumonia deaths	Polymyositis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	2	0	1	1	1	0	0	-----
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	1	0	1	0	0	-----
Massachusetts:												
Boston.....	16	0	-----	0	4	0	3	4	7	0	2	16
Fall River.....	0	0	-----	0	1	0	0	0	2	0	0	2
Springfield.....	0	0	-----	0	2	0	0	0	0	0	0	15
Worcester.....	1	0	-----	0	2	0	2	10	1	0	0	16
Rhode Island:												
Providence.....	1	0	-----	0	3	1	2	0	0	0	0	29
Connecticut:												
Bridgeport.....	0	0	-----	0	2	0	0	0	0	0	0	2
Hartford.....	0	0	-----	0	1	1	1	0	2	0	0	2
New Haven.....	1	0	-----	0	6	0	1	0	2	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo.....	4	0	-----	0	1	0	2	0	5	0	0	4
New York.....	6	0	4	0	18	3	38	69	18	0	5	52
Rochester.....	0	0	-----	0	1	0	0	2	5	0	0	2
Syracuse.....	0	1	-----	0	-----	1	2	1	1	0	0	5
New Jersey:												
Camden.....	0	0	-----	0	-----	0	0	0	0	0	1	1
Newark.....	0	0	-----	0	1	0	2	0	4	0	0	14
Trenton.....	0	0	-----	0	-----	0	2	1	0	0	0	6
Pennsylvania:												
Philadelphia.....	6	0	-----	0	8	2	15	4	9	0	2	26
Pittsburgh.....	2	0	-----	0	12	1	1	3	5	0	0	9
Reading.....	0	0	-----	0	1	0	1	0	0	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0	-----	0	-----	2	2	3	1	0	1	2
Cleveland.....	0	0	-----	0	25	2	7	17	11	0	2	9
Indiana:												
Fort Wayne.....	0	0	-----	0	1	0	2	1	0	0	0	5
Indianapolis.....	3	1	-----	0	1	0	4	2	1	0	0	9
South Bend.....	0	0	-----	0	-----	0	0	1	2	0	0	-----
Terre Haute.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Illinois:												
Chicago.....	0	0	-----	0	6	2	20	38	0	0	1	51
Springfield.....	1	0	-----	0	-----	0	1	3	0	0	0	-----
Michigan:												
Detroit.....	2	0	1	2	1	1	6	17	14	0	0	57
Flint.....	0	0	-----	0	0	0	3	0	4	0	0	14
Grand Rapids.....	0	0	-----	0	2	0	0	3	1	0	1	5
Wisconsin:												
Kenosha.....	0	0	-----	0	-----	0	0	4	1	0	0	3
Milwaukee.....	0	0	-----	0	2	0	4	12	7	0	0	78
Racine.....	0	0	-----	0	-----	0	0	2	1	0	0	-----
Superior.....	0	0	-----	0	-----	0	0	1	2	0	0	-----
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	-----	0	-----	0	2	6	0	0	0	4
Minneapolis.....	1	0	-----	0	2	0	2	10	0	0	0	1
St. Paul.....	1	0	-----	0	-----	0	2	5	2	0	0	6
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	4	16	5	0	0	3
St. Joseph.....	0	0	-----	0	-----	0	0	0	3	0	0	4
St. Louis.....	2	0	2	0	2	0	4	15	2	0	1	4

## City reports for week ended Sept. 28, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polio-myelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0	-----	0	-----	0	0	19	1	0	0	-----
Kansas:												
Topeka.....	1	0	-----	0	-----	0	0	4	2	0	0	-----
Wichita.....	0	0	-----	0	1	0	1	3	0	0	0	-----
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	-----	0	3	3	1	0	0	-----
Maryland:												
Baltimore.....	1	0	-----	0	1	0	7	1	3	0	0	13
Cumberland.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Frederick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0	-----	0	4	0	5	2	4	0	1	3
Virginia:												
Lynchburg.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Richmond.....	1	0	-----	0	4	0	2	0	3	0	1	1
Roanoke.....	3	0	-----	0	-----	0	0	1	2	0	0	-----
West Virginia:												
Wheeling.....	0	0	-----	0	-----	0	0	0	2	0	0	2
North Carolina:												
Raleigh.....	0	0	-----	0	-----	0	0	1	0	0	1	2
Wilmington.....	0	0	-----	0	3	0	0	1	0	0	0	-----
Winston-Salem.....	0	0	-----	0	-----	0	0	0	1	0	0	6
South Carolina:												
Charleston.....	0	0	6	0	1	0	0	0	0	0	0	-----
Georgia:												
Atlanta.....	1	0	1	0	-----	0	2	1	1	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Savannah.....	0	0	-----	0	3	0	1	0	1	0	0	-----
Florida:												
Tampa.....	2	0	1	1	-----	2	1	1	2	0	1	-----
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	-----	0	1	0	7	3	2	0	0	6
Nashville.....	0	0	-----	1	-----	0	0	0	0	0	0	-----
Alabama:												
Birmingham.....	0	0	3	1	-----	0	3	2	0	0	0	-----
Mobile.....	1	0	-----	0	-----	0	2	2	0	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	1	0	0	3	0	0	0	1
Louisiana:												
New Orleans.....	1	0	-----	0	1	0	9	3	1	0	0	1
Shreveport.....	0	0	-----	0	-----	0	5	0	0	0	0	-----
Texas:												
Dallas.....	2	0	-----	0	-----	0	2	2	0	0	0	2
Galveston.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Houston.....	0	0	-----	0	1	0	2	2	1	0	2	-----
San Antonio.....	0	0	-----	0	1	0	4	2	0	0	0	-----
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Great Falls.....	0	0	-----	0	-----	0	1	2	0	0	0	-----
Helena.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Missoula.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	-----	0	0	0	2	0	0	-----
Colorado:												
Denver.....	0	0	5	0	2	1	7	8	3	0	0	2
Utah:												
Salt Lake City.....	0	0	-----	0	2	0	0	4	1	0	0	1

## City reports for week ended Sept. 28, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	4	0	0	0	1	0	3	5	1	0	0	9
Spokane.....	0	0	0	0	0	0	0	7	2	0	0	3
Tacoma.....	0	0	0	0	1	0	0	0	0	0	0	1
California:												
Los Angeles.....	0	0	2	0	10	1	3	30	10	0	1	12
Sacramento.....	0	0	0	0	0	0	0	0	1	0	0	2
San Francisco.....	0	0	0	0	2	0	8	6	6	0	0	6
Total.....	66	2	25	5	152	20	210	309	173	0	23	538
Corresponding week, 1945.....	51	---	15	8	181	---	223	---	312	0	20	722
Average, 1941-45.....	64	---	38	10	104	---	1 243	---	334	0	27	837

<sup>1</sup> 3-year average, 1943-45.

<sup>2</sup> 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: New York 1; Chicago 2; San Francisco 1.

*Dysentery, bacillary.*—Cases: Buffalo 2; Los Angeles 1.

*Dysentery, unspecified.*—Cases: Baltimore 1; San Antonio 4.

*Leprosy.*—Cases: New York 1.

*Typhus fever, endemic.*—Cases: Boston 1 (presumably murine, not yet proved); New York 1; Philadelphia 1; Atlanta 1; Tampa 1; Nashville 2; Little Rock 1; New Orleans 1; Houston 3; San Antonio 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 33,898,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	49.9	0.0	0.0	0.0	60	5.3	28.9	39.4	42	0.0	5.3	223
Middle Atlantic.....	8.3	0.5	1.9	0.0	19	3.2	20.2	37.0	22	0.0	3.7	60
East North Central.....	4.4	0.6	0.6	1.3	24	4.4	31.0	155.7	28	0.0	3.2	147
West North Central.....	10.1	0.0	4.0	0.0	10	0.0	28.2	155.0	30	0.0	2.0	44
South Atlantic.....	13.4	0.0	13.4	1.7	35	3.3	30.8	18.4	33	0.0	0.7	45
East South Central.....	5.9	0.0	17.7	11.8	6	0.0	70.8	41.3	12	0.0	0.0	35
West South Central.....	8.6	0.0	0.0	0.0	11	0.0	63.1	34.4	6	0.0	5.7	11
Mountain.....	0.0	0.0	43.5	0.0	35	8.7	69.4	121.4	82	0.0	0.0	26
Pacific.....	6.3	0.0	3.2	0.0	22	1.6	14.2	75.9	32	0.0	1.6	49
Total.....	10.0	0.3	3.9	0.8	23	3.1	32.4	60.9	27	0.0	3.5	83

## PLAGUE INFECTION IN KERN COUNTY, CALIF.

Under date of October 1, 1946, plague infection was reported proved, on September 30, in a pool of 97 lice from 24 ground squirrels, *C. beecheyi*, shot 1 mile south and 2 miles east of El Tejon School, Kern County, Calif., and received at the laboratory on September 11.

# FOREIGN REPORTS

## CANADA

*Provinces—Communicable diseases—Week ended September 14, 1946.*—During the week ended September 14, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		4		17	65	22	13	19	42	182
Diphtheria.....		1		49	5		1	1	3	62
Dysentery:										
Amebic.....					1					1
Bacillary.....					1					1
German measles.....		2			7		3	1	3	16
Influenza.....		6			7				6	19
Measles.....		7		30	37	9	42	15	3	143
Meningitis, meningococcus.....					1					1
Mumps.....				22	81	19	57	13	40	232
Poliomyelitis.....	11	1	13	225	34	6	3	6	2	301
Scarlet fever.....	2	1	4	26	49	11	5	3	7	108
Tuberculosis (all forms).....		1	7	115	50	14	6	52	23	268
Typhoid and paratyphoid fever.....		1	1	27	4				2	35
Undulant fever.....			1	3	4					8
Veneral diseases:										
Gonorrhoea.....	9	18	10	85	129	62	29	65	89	496
Syphilis.....	2	5	6	100	84	10	19	12	48	286
Other forms.....									3	3
Whooping cough.....		20	2	52	82	1		3	5	165

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, UNRRA, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

### CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January- July 1940	August 1940	September 1940—week ended—			
				7	14	21	28
ASIA							
Burma.....	C	1,215	35				
Bassein.....	C	28	1				
Moulmein.....	C	54	21				
Rangoon.....	C	22	1				
Ceylon.....	O	75	6				
China:							
Anhui Province.....	C	612	1,053				
Chekiang Province.....	C	1,103	1,233				
Formosa, Island of.....	C	806					
Fukien Province.....	C	629	215				
Koochow.....	C	441	204				
Honan Province.....	C	491	392				
Hopeh Province.....	C	43	160		13		
Hunan Province.....	C	488	623		12		
Hupeh Province.....	C	175	45				
Ichang Province.....	C	147					

<sup>1</sup> For the period Sept. 1-10, 1946.

## CHOLERA—Continued

Place	January- July 1946	August 1946	September 1946—week ended—			
			7	14	21	28
ASIA—continued						
China—Con.						
Kiangsi Province.....	O 148	1,335				
Kiangsu Province.....	O 26,224	1,841		1,118		
Shanghai.....	O 3,455	933		190		
Kwangsi Province.....	O 707	94				
Kwangtung Province.....	O 2,772	1,095				
Canton.....	O 1,931	17				
Hong Kong.....	O 437	55	3	2	1	2
Kweichow Province.....	O 8					
Macao, Island of.....	O			1	1	
Shantung Province.....	O	14				
Szechwan Province.....	O 66	2				
Yunnan Province.....	O 12					
India.....	O 54,071	2,468				
Calcutta.....	O 1,647	37	18	30	20	
Chittagong.....	O 8					
Madras.....	O 3					
India (French).....	O 1					
Indochina (French):						
Cambodia.....	O 271					
Cochinchina.....	O 819					
Bien Hoa.....	O 24					
Chaudok.....	O 21					
Mytho.....	O 142					
Saigon-Cholon.....	O 35					
Vinh-long.....	O 7					
Japan.....	O 364	626				
Korea (Chosen).....	P	11,351				
Malay States.....	O 211	23				
Manchuria.....	O 15,284	113				
Siam (Thailand).....	O 3,051	206				
Bangkok.....	O 397	17	4	8	5	6
Straits Settlements: Singapore.....	O 41					

\* Includes imported cases.

\* From the beginning of the outbreak in April or May, to approximately Sept. 1, 1946.

\* Imported.

## PLAGUE

[O indicates cases; P, present]

AFRICA						
Algeria.....	O	2				
Bechuanaland.....	O	10				
Belgian Congo.....	O	17	19			
British East Africa:						
Kenya.....	O	24	3	2		
Uganda.....	O	12				
Egypt.....	O	175	38	1	1	1
Alexandria.....	O	109	16	1		
Ismailiya.....	O	22	5			
Matariya.....	O	2	10			
Port Said.....	O	10	6	1		1
Suez.....	O	32				
Libya: Tripolitania—Plague-infected rats.....	O		3			
Madagascar.....	O	137	3	1		
Union of South Africa.....	O	1	1			
ASIA						
Burma.....	O	983	119	7		
Bassan.....	O	21	1			
Rangoon.....	O	139	7			
China:						
Chekiang Province.....	O	412	60			
Formosa, Island of.....	O	9				
Fukien Province.....	O	4,139	139			
Amoy.....	O	295				
Foochow.....	O	1,363	17			
Kiangsi Province.....	O	185	71			
Kwangtung Province.....	O	409	6			
Yunnan Province.....	O	97	36			
India.....	O	12,332	461			
Indochina (French): Cochinchina.....	O	4	44			
Java.....	O	31	1			
Manchuria.....	O	452				
Palestine.....	O	16				
Siam (Thailand).....	O	19	3			

\* Includes 2 suspected cases.

\* Includes 16 cases of pneumonic plague.

\* For the period Sept. 1-10, 1946.

\* Pneumonic plague.

## PLAGUE—Continued

Place	January- July 1946	August 1946	September 1946—week ended—			
			7	14	21	28
EUROPE						
Great Britain: Malta, Island of.....	O	6	-----	-----	-----	-----
Portugal: Azores.....	O	15	-----	-----	-----	-----
NORTH AMERICA						
Canada. <sup>a</sup>						
SOUTH AMERICA						
Bolivia:						
Chuquisaca Department.....	O	1	-----	-----	-----	-----
Santa Cruz Department.....	O	12	-----	-----	-----	-----
Tarija Department—Plague-infected rats.....	P		-----	-----	-----	-----
Ecuador:						
Chimborazo Province.....	O	2	-----	-----	-----	-----
Loja Province.....	O	6	4	-----	-----	-----
Peru:						
Lambayeque Department.....	O	11	-----	-----	-----	-----
Lima Department.....	O	19	-----	-----	-----	-----
Piura Department.....	O	15	-----	-----	-----	-----
OCEANIA						
Hawaii Territory: Plague-infected rats.....		5	-----	-----	-----	-----

<sup>a</sup> Includes 2 cases of pneumonic plague.<sup>b</sup> The imported suspected case previously reported has not been confirmed. Under date of Sept. 14, 1946, plague infection was reported in a pool of fleas from squirrels in Alaska and in a pool of fleas from squirrels in Superb, Saskatchewan.<sup>c</sup> Plague infection was also proved positive in Hawaii Territory on Feb. 5, 1946, in a pool of 26 rats, and on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice. Under date of July 8, 1946, plague infection was reported in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats. Under date of July 17, 1946, plague infection was reported in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats. Under date of Sept. 12, 1946, plague infection was reported in a pool of 48 fleas recovered from 22 rodents.

## SMALLPOX

[O indicates cases; P, present]

AFRICA						
Algeria.....	O	183				
Basutoland.....		27	19			
Belgian Congo.....	O	1,236	1,064	486		
British East Africa:						
Kenya.....	O	626	97	19	18	
Nyasaland.....		289	59	8	13	
Tanganyika.....	O	4,106	811			
Uganda.....	O	509	20	1		
Cameroon (French).....	O	67	1			
Dahomey.....	O	1,230	181			
Egypt.....	O	374	5			
Eritrea.....	O	12				
French Equatorial Africa.....	O	185	9			
French Guinea.....	O	705	26			
French West Africa: Dakar District.....	O	40				
Gambia.....	O	7				
Gold Coast.....	O	777	115		15	
Ivory Coast.....	O	1,045	116			
Liberia.....	O			P		
Libya.....	O	116	21	81	45	
Madagascar.....	O		1			
Mauritania.....	O	1				
Morocco (French).....	O	1,837	25			
Morocco (Int. Zone).....	O	175				
Morocco (Spanish).....	O	5				
Mozambique.....	O	4				
Nigeria.....	O	5,414				
Niger Territory.....	O	427	9			
Rhodesia:						
Northern.....	O	311	35	5	1	
Southern.....	O	2	2			
Senegal.....	O	95				
Sierra Leone.....	O	397				
Somaliland (Italian).....	O	1				
Sudan (Anglo-Egyptian).....	O	43	8	1		
Sudan (French).....	O	1,852	43			
Togo (French).....	O	158	55			
Tunisia.....	O	38				
Union of South Africa.....	O	204	P	P	P	P

<sup>1</sup> Includes alastrim.<sup>2</sup> Alastrim.

## SMALLPOX—Continued

Place	January- July 1946	August 1946	September 1946—week ended—			
			7	14	21	28
ASIA						
Arabia.....	O	1				
Burma.....	O	1,586	93			
Ceylon.....	O	346	1			
China.....	O	675	80	31	29	22
India.....	O	54,400	1,327			31
India (French).....	O	3				
Indochina (French).....	O	1,597	49			
Iran.....	O	24				
Iraq.....	O	5	3			
Japan.....	O	17,606	41			
Malay States.....	O	484	44	15	24	13
Palestine.....	O	2				
Rhodes, Island of.....	O	1				
Siam (Thailand).....	O	15,491	752			
Straits Settlements.....	O	31	20	1	14	1
Syria and Lebanon.....	O	8				
Turkey (See Turkey in Europe).						
EUROPE						
Czechoslovakia.....	O	24				
France.....	O	15				
Germany.....	O	1				
Gibraltar.....	O	3				
Great Britain:						
England and Wales.....	O	53				
Malta, Island of.....	O	7				
Scotland.....	O	2				
Greece.....	O	114				
Italy.....	O	462	21			
Portugal.....	O	38	8			
Spain.....	O	5				
Turkey.....	O	16				
Yugoslavia.....	O	1				
NORTH AMERICA						
Canada.....	O	2				
Guatemala.....	O	55				
Honduras.....	O	4				
Mexico.....	O	333				
SOUTH AMERICA						
Argentina.....	O	67	1			
Bolivia.....	O	452				
Brazil.....	O	122	17			
Colombia.....	O	587	74			
Ecuador.....	O	42	5			
Paraguay.....	O	252				
Peru.....	O	381				
Uruguay.....	O	36	4			
Venezuela.....	O	1728	104			
OCEANIA						
Hawaii Territory.....	O	1				

1 Includes alastrim.

2 Includes 1 imported case.

3 Imported.

4 Includes imported cases.

5 Off-shipping.

## TYPHUS FEVER \*

[C indicates cases; P, present]

Place	January- July 1946	August 1946	September 1946—week ended—			
			7	14	21	28
AFRICA						
Algeria.....	C 603	.....	.....	.....	.....	.....
Basutoland.....	C 6	1	.....	.....	.....	.....
Belgian Congo <sup>1</sup> .....	C 2,217	51	37	.....	.....	.....
British East Africa: Kenya <sup>1</sup> .....	C 21	.....	.....	.....	.....	.....
Egypt.....	C 1,318	12	6	.....	.....	.....
Eritrea.....	C 465	93	19	.....	.....	.....
French West Africa: Dakar District.....	C 7	.....	.....	.....	.....	.....
Libya.....	C 77	6	.....	.....	.....	.....
Morocco (French).....	C 3,553	77	.....	.....	.....	.....
Morocco (Int. Zone).....	C 52	1	.....	.....	.....	.....
Morocco (Spanish).....	C 11	2	.....	.....	.....	.....
Nigeria.....	C 26	.....	.....	.....	.....	.....
Rhodesia, Northern.....	C 1	.....	.....	.....	.....	.....
Sierra Leone <sup>1</sup> .....	C 3	.....	.....	.....	.....	.....
Tunisia <sup>1</sup> .....	C 183	.....	.....	.....	.....	.....
Union of South Africa <sup>1</sup> .....	C 225	P	P	P	P	.....
ASIA						
Arabia <sup>2</sup> .....	C 1	1	.....	.....	.....	.....
Burma <sup>2</sup> .....	C 1	.....	.....	.....	.....	.....
China <sup>1</sup> .....	C 70	4	.....	1	.....	.....
India.....	C 284	.....	.....	.....	.....	.....
Indochina (French).....	C 9	52	.....	.....	.....	.....
Iran.....	C 137	.....	.....	.....	.....	.....
Iraq.....	C 156	17	3	.....	5	.....
Japan.....	C 30,446	213	.....	.....	.....	.....
Malay States.....	C 3	.....	.....	.....	.....	.....
Palestine <sup>2</sup> .....	C 41	.....	.....	.....	.....	.....
Straits Settlements.....	C 1	.....	.....	.....	.....	.....
Syria and Lebanon.....	C 78	.....	.....	.....	.....	.....
Trans-Jordan.....	C 21	.....	.....	.....	.....	.....
Turkey (See Turkey in Europe).....	C	.....	.....	.....	.....	.....
EUROPE						
Albania.....	C 88	.....	.....	.....	.....	.....
Austria.....	C 34	.....	.....	.....	.....	.....
Belgium <sup>1</sup> .....	C 4	.....	.....	.....	.....	.....
Bulgaria.....	C 946	8	.....	.....	.....	.....
Czechoslovakia <sup>1</sup> .....	C 766	19	.....	.....	.....	.....
France <sup>1</sup> .....	C 15	.....	.....	.....	.....	.....
Germany.....	C 1,859	8	.....	.....	.....	.....
Great Britain:		.....	.....	.....	.....	.....
England and Wales.....	C 1	.....	.....	.....	.....	.....
Malta and Gozo <sup>1</sup> .....	C 13	1	1	.....	.....	.....
Greece <sup>1</sup> .....	C 314	71	44	38	30	.....
Hungary.....	C 794	25	.....	5	5	.....
Italy.....	C 8	.....	.....	.....	.....	.....
Netherlands <sup>1</sup> .....	C 15	.....	.....	.....	.....	.....
Poland.....	C 3,058	129	10	9	.....	.....
Portugal.....	C 4	2	.....	.....	1	.....
Rumania.....	C 7,335	60	30	.....	.....	.....
Spain.....	C 10	2	.....	.....	.....	.....
Sweden <sup>2</sup> .....	C 1	.....	.....	.....	.....	.....
Switzerland <sup>2</sup> .....	C 1	.....	.....	.....	.....	.....
Turkey.....	C 1,103	28	4	8	14	.....
Yugoslavia.....	C 2,225	.....	.....	.....	.....	.....
NORTH AMERICA						
Costa Rica <sup>2</sup> .....	C 53	8	1	3	.....	.....
Cuba <sup>2</sup> .....	C 19	1	.....	.....	.....	.....
Guatemala.....	C 433	.....	.....	.....	.....	.....
Jamaica <sup>2</sup> .....	C 24	7	.....	.....	.....	.....
Mexico.....	C 956	.....	.....	.....	.....	.....
Panama (Republic).....	C 2	.....	.....	.....	.....	.....
Puerto Rico <sup>2</sup> .....	C 63	17	2	2	.....	.....
Virgin Islands <sup>2</sup> .....	C 2	.....	.....	.....	.....	.....

\* Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

<sup>1</sup> Includes cases of murine type.<sup>2</sup> Murine type.



## TYPHUS FEVER—Continued

Place	January- July 1946	August 1946	September 1946—week ended—			
			6	13	20	27
SOUTH AMERICA						
Argentina.....	O	4	1			
Bolivia.....	O	212				
Chile.....	O	328				
Colombia.....	O	205				
Curacao <sup>2</sup> .....	O		1			
Ecuador <sup>1</sup> .....	O	647	118			
Paraguay.....	O	1				
Peru.....	O	580				
Venezuela <sup>1</sup> .....	O	73	15			
OCEANIA						
Australia <sup>1</sup> .....	O	99	1			
Hawaii Territory <sup>2</sup> .....	O	24	12			

<sup>1</sup> Includes cases of murine type.<sup>2</sup> Murine type.

## YELLOW FEVER

[O indicates cases; D, deaths]

<b>AFRICA</b>						
<b>Nigeria:</b>						
Ibadan.....	O	1				
Ilesha.....	O		12			
Ilorin.....	O	1				
Kafanchan.....	O	2				
Ogbomosho.....	O	41				
Oshogbo.....	O		11			
Sapele.....	O		15			
Sierra Leone: Fufehin.....	O	1				
<b>SOUTH AMERICA</b>						
Bolivia: Santa Cruz Department.....	D	40				
Brazil: Para State.....	D	1				
<b>Colombia:</b>						
Caqueta Territory.....	D	1				
Magdalena Department.....	D	1				
Santander Department.....	D	6				
Peru: San Martin Department.....	D	1				
<b>Venezuela:</b>						
Tachira State.....	O	4				
Trujillo State.....	O	4				
Zulia State.....	O	4				

<sup>1</sup> Suspected.<sup>2</sup> Diagnosis confirmed in 14 cases and 10 deaths.

X

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

**G. ST. J. PERROTT, *Chief of Division***

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# Public Health Reports

**VOLUME 61      NOVEMBER 1, 1946      NUMBER 44**

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**TUBERCULOSIS CONTROL ISSUE NO. 9**

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**Persistence of Fluoroscopic Screens**



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# Public Health Reports

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## EDITORIAL

### CONTROVERSIAL ISSUES IN TUBERCULOSIS CONTROL

In the field of tuberculosis control there are many tools and methods about which there is considerable controversy. As in any field where the thinking is healthy and progressive, the variety of opinion is vigorously expressed and firmly held. In consequence, practice differs.

Among the most highly controversial problems, the use and importance of the tuberculin test is of first significance. In the diagnosis of tuberculosis and for mass surveys, the tuberculin dosage is in dispute. A high initial dose is used in some quarters, while a low dosage is employed in others. There is also great difference of opinion concerning the interpretation of tuberculin reactions. Similarly, the reading of tuberculous activity in the X-ray evidence of lesions has its champions, while opposing groups believe it impossible to read such activity on an X-ray film. These opposing groups also present contrary solutions to the problem of interpreting primary and reinfection tuberculosis from the X-ray film. Many specialists think we cannot perceive from the X-ray film whether a lesion is primary or reinfection. In spite of the extensive researches done in this field, many interpreters still classify cases principally on the evidence of X-ray films. Furthermore, there is some difference of opinion on the proper disposition of cases that have positive gastric lavage. The more advanced school of thought believes that such cases can be released from the sanatorium and that children with positive gastric findings can go to school.

This is the ninth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at \$1.00 per year; \$1.25 foreign.

There are other issues, such as the value of miniature films, the significance of BCG vaccination, and the immunity that may be given by a positive tuberculin reaction. These and many other differences of opinion need clarification. It is obvious that extensive research should go forward, so that unanimity of opinion may in future reinforce diagnosis.

Because it is basic in the control of tuberculosis, the importance of the tuberculin test should have first consideration. It must be clearly understood at the outset that mass radiography has not displaced the tuberculin test. Indeed, it must be stressed that there is greater need than ever for such testing. The tuberculin test is invaluable in detecting reactors to tuberculin among contacts; it permits more accurate differential diagnosis; and it provides sample checks of population groups at yearly intervals in order to arrive at variations in levels of infection. This determinant combined with the findings of mass radiography, which in many instances has resulted in the examination of a majority of the adults in entire communities, will be a precise tool for evaluating the tuberculosis problem in any given area.

Some leading workers in tuberculosis control have utilized the results of tuberculin tests in only two categories—reactors and non-reactors. Others have criticized such usage by pointing out that there is a third group—converters; that is, persons who convert from nonreactor to reactor from one time to another.

Extensive researches among more than 15,000 student nurses in many areas throughout the country have led the Tuberculosis Control Division to conclude that the most critical time for the reactor is the first several years after the change from negative to positive. During these first years the body is fighting infection, and everything should be done to maintain high resistance. The Division is apprehensive of the apparent neglect of this critical period in the life of the converter. It is emphasized that the immediate postconversion period requires close follow-up in order to keep resistance at a high level. Also, it appears to be desirable to minimize exposure until the body has gained control of the infection, and the danger of disease has lessened.

We do not yet know what is the ultimate effect of early massive exposure which does not result in immediately apparent tuberculosis. The later experience of the cohorts of those among whom there was a high mortality rate when young needs extensive study, and the tuberculin test is perhaps our most effective instrument in the discovery of such knowledge. We must institute a long-time life-table study of the converters at various ages. At the same time we must extend the use of tuberculin tests in conjunction with mass radiography, for the purpose of obtaining the infection rate in various age,

race, and economic groups in the United States. The tuberculin test properly applied to random groups at regular intervals is a sensitive index to what is being accomplished by all other control methods now in use.

The leading article of this issue, "The Establishment and Use of Fundamental Procedures in Tuberculosis Control," is a forceful description of a point of view that is at variance with the thinking of some other workers in the field. All opinions, however various, merit the most careful study if we are at last to solve the many complex problems of tuberculosis control.

HERMAN E. HILLEBOE,

*Medical Director, Chief, Tuberculosis Control Division.*

## THE ESTABLISHMENT AND USE OF FUNDAMENTAL PROCEDURES IN TUBERCULOSIS CONTROL

By J. A. MYERS, *Professor of Medicine, Department of Preventive Medicine and Public Health, School of Medicine, University of Minnesota*

A chronic disease that may exist in a person for several years or decades is best studied through early detection and subsequent observation in the person affected. Prior to 1920, however, this procedure was seldom followed in the study of tuberculosis in human beings. In that year, an opportunity was afforded to study the disease among university students, where many could be observed over a considerable period of time. For the past 26 years, these observations have been continued. In 1921 the Minneapolis Division of Health arranged for a longitudinal study of tuberculosis among children, from birth through 18 years of age; and later a provision was made by which the studies could be continued among those who had reached adulthood, as well as among other adults.

A serious tuberculosis problem confronted the city of Minneapolis in 1920. The mortality rate was 120 per 100,000 population, and though the morbidity rate was unknown, the health department had many ill persons on record—less than half, probably, of all those who suffered from clinical tuberculosis. Only a small number of sanatorium and hospital beds were available. The majority of persons with infectious disease remained in their homes, and advanced cases in institutions were often permitted to return home so that they could "die happy among friends." A considerable amount of tuberculosis prevailed among animals, particularly cattle, and frequently dairy products were found to be contaminated with living tubercle bacilli of the bovine type. Hence the disease was readily communicated from person to person, and not infrequently, from animal to person.



The incidence of tuberculin reactors had not been determined by 1920 for any large group of persons at a given age level. It was estimated, however, that in the United States, almost 100 percent of the adult population would have reacted if tested. A sharp distinction was made between tuberculous infection and tuberculous disease. A person was said to have "infection without disease" if he reacted to tuberculin but showed no symptoms or lesions, and was regarded as having "disease" if he showed lesions or was ill. Those of the former class—more numerous at any given time than those of the latter—were considered to have been immunized; and it was supposed that for the rest of their lives they would walk within a charmed circle of safety. A tuberculin reaction was thought to be an asset. The person who did not react, by young adulthood at least, was believed to be in a hazardous position: if he then became infected, having failed to become immune through a previous infection, he was liable to develop uncontrollable tuberculosis.

Despite this belief, a national movement was under way to increase the number of hospital and sanatorium beds, to pasteurize milk, and to eradicate the disease from cattle. To many, this was tantamount to national suicide; for it was thought that these steps, if carried to extremes, would deprive infants and children of tubercle bacilli, especially of the bovine type, and would necessitate their reaching maturity without immunity—to be vanquished if later infected. This and other paradoxes, by the confusion they created in the minds of physicians, greatly complicated tuberculosis control work.

Tuberculosis in children was considered to be highly fatal. While infection was generally regarded as an asset, the opinion prevailed that if it occurred within the first 2 years of life, death would follow in 50 to 80 percent of those infected, before immunity could be established. This erroneous view was based on observations of ill infants, the majority of whom had reinfection type of disease, such as pneumonia, meningitis, and miliary tuberculosis. A group of infants with tuberculin reactions but without illness had not been observed to determine whether all infections were highly fatal. Nor had older children been observed to determine the actual evolution of tuberculosis during childhood and adulthood, or the course of the disease in persons first infected as adults.

In 1920, almost all of the present-day diagnostic equipment was available, including the stethoscope, clinical thermometer, microscope, tuberculin test, X-ray, and bronchoscope. Much emphasis was placed upon history of exposure, symptoms, and signs elicited by the conventional chest examination. Tuberculin tests and chest X-ray inspections were seldom made. All equipment was employed routinely, with a view to the proper evaluation of the various

diagnostic procedures, methods of dealing with cases, and preventive measures, and especially to the study of the evolutionary process of tuberculosis in the human body.

In little more than a quarter of a century, radical changes have been made in the approach to the total problem of tuberculosis control. The following results have been achieved.

#### THE TUBERCULIN TEST

Prior to 1921, the tuberculin test was not given extensively, as all adults and most older children were thought to be infected with tubercle bacilli. It was used merely as a confirmatory procedure when examinations revealed, for example, rales and X-ray shadows. In the work among children begun in 1921 in Minneapolis, however, the test was administered routinely; and since 1928, it has been used in examining all students entering the University of Minnesota. The epidermal (Pirquet) method of administration was employed until 1929, when the intracutaneous (Mantoux) method was adopted. Other methods were given adequate comparative trials, but each was discarded in favor of the intracutaneous.

Old tuberculin, procured from the Saranac Lake Laboratory, has been used for the most part, but comparative tests with purified protein derivative (PPD) have been made occasionally on sizable groups. No significant difference has been indicated by the results obtained with the two substances. In using the former, the initial dose has been 0.1 mg., and 1.0 mg. has been given if no reaction to this occurred. In using PPD, first and second injections of 0.00002 mg. and 0.005 mg., respectively, have been given. At first, readings were made 48 hours after administration, but the interval was later increased to 72 hours, in view of the finding that, as a rule, erythema due to trauma will have disappeared in that time, whereas a characteristic tuberculin reaction always lasts 72 hours, and usually much longer.

A true tuberculin reaction presents definite characteristics, consisting of an area of edema, induration, or both, with a diameter of 5 mm. or more at the site of administration. This may or may not be surrounded by hyperemia. In the absence of induration or edema, hyperemia does not constitute a tuberculin reaction and should therefore be ignored. In the majority of instances, however, there is either a total absence of response to the test or an unmistakable reaction. (Hence, we no longer speak of negative and positive reactors, but rather of nonreactors and reactors.) Edema or induration of slightly less than 5 mm. in diameter, which is seen occasionally, should be read as a questionable reaction, and the test should be repeated in one or two months. Such a reaction may represent only

residual trauma, or may be due to a low degree of allergy. The latter possibility may be explained as follows: Infection may have occurred so recently that only a low degree of allergy has been established, or the allergy may have so diminished that a milligram of tuberculin cannot elicit a characteristic reaction, which may be the case if tuberculous lesions of the primary or reinfection type have existed for several years without the occurrence of exogenous or endogenous reinfections. If, in a given instance, the former explanation is correct, the repetition of the test in a month or so will elicit a characteristic reaction. If the second test is not decisive, the latter explanation is indicated, and the dose should be doubled. And if a question still remains, it is entirely safe to administer 5 mg. of tuberculin. These larger doses are unnecessary, however, unless a lesion of undetermined etiology has been located. In most children and young adults with primary tuberculosis, there has not been time as a rule for the allergy to wane significantly; and therefore a single dose of 0.1 mg. of old tuberculin, or a corresponding dose of PPD, is usually adequate.

It may be stated that there are three main sources of error in administering and reading the tuberculin test: (1) Material is not tested to assure adequate potency; (2) the needle is inserted too deeply, so that the tuberculin is deposited subcutaneously; (3) the characteristics of edema or induration, or both, are not present, and erythema or minute nodulation at the site of injection is considered a reaction. This can usually be avoided by reading at 72 hours.

Regardless of the age of the person tested, a characteristic tuberculin reaction indicates the presence of primary tuberculous lesions produced by either the bovine or human type of tubercle bacillus. Since tuberculin is not, as was formerly believed, specific for infection caused by the type of tubercle bacillus from which it is prepared, it is satisfactory for testing whether made from organisms of the bovine or human type. As a result of the efforts of the veterinarians and their allies, it has been uncommon, in recent years, for a person in the United States to become infected with tubercle bacilli of the bovine type; and therefore, among the young children of this country, organisms of the human type are responsible for nearly all of the existing primary lesions. Among adults, however, primary lesions produced by the bovine type probably remain. This is an important consideration in the epidemiology of tuberculosis.

Although the tuberculin test admits of an absolute diagnosis of primary tuberculosis, it is of no value in locating the lesions, in differentiating primary from reinfection type of disease, in determining the extent of lesions, or in detecting the presence of clinical activity. A relatively recent infection or reinfection is apparently indicated by a

high degree of allergy. There is some evidence to the effect that in persons with primary tuberculosis, a waning allergy may from time to time be augmented by exogenous or endogenous reinfections. If allergy persists at a high level, it may indicate that the person is in association with a contagious case of tuberculosis, or is being occasionally reinfected endogenously.

The presence of primary tuberculosis cannot be determined by the tuberculin test, or by any other procedure of the examination, during the first 3 to 7 weeks of development. This period is required for allergy to tuberculo-protein to develop to such a degree as to cause a reaction. At the opposite extreme of the evolution of tuberculosis—when the disease is rapidly progressive or is approaching a fatal termination—allergy may so decrease that it cannot be detected by the usual test. In such cases, however, it is extremely rare for allergy to disappear completely, and it can usually be detected by administration of sufficiently large doses of tuberculin.

Twenty-five years ago, the tuberculin test was believed to be only applicable to children; but experience has taught that it is of great value in testing persons of any age. In the Minneapolis area, more than 90 percent of the young adults, and even many elderly persons, do not have primary tuberculosis, and are therefore nonreactors to tuberculin.

It has been found that as an epidemiological agent, the test excels every other procedure of examination. The tuberculin reactor has received tubercle bacilli from some person or animal, and often the contact has been directly with a person emitting tubercle bacilli. On numerous occasions, only the tuberculin reaction of a child or adult has revealed unsuspected infectious cases among his associates.

Every person who reacts characteristically to tuberculin has tuberculous lesions, regardless of his state of health and the lack of other evidence. Such a person has tuberculosis just as certainly as the patient who is dying from the disease. The difference is one of degree. In the person who is dying, the disease has evolved through various stages; but at one time that person could have been found to have no evidence of tuberculosis except the tuberculin reaction.

The test excels, further, in determining the effectiveness of a tuberculosis control program. In 1926, for example, children in grade schools selected throughout the city of Minneapolis were tested with tuberculin, and 47.3 percent reacted. Tuberculosis control measures were increased by adding sanatorium beds, by eliminating infected cattle from herds, by more extensive educational work, etc. The effectiveness of the additional measures could only be determined by the tuberculin test. In 1936 the test was given in the same schools; 18.9 percent reacted, and control measures were again in-

tensified. Testing in these schools in 1944 revealed that only 7.7 percent of those tested were reactors.

Among the children 6 years of age tested in 1926, the percentage of reactors was 20.8, representing an infection attack rate of 3.46 per year. In 1936 the percentage of 6-year-olds who reacted was 13.5, and in 1944 only 2.1 percent reacted—an attack rate of approximately one-third of 1 percent per annum. Hence, of 300 uninfected children aged 6 or under in 1926, about 10 were infected by 1927; whereas only 1 of 300 uninfected in 1944 was infected by 1945.

Among the 6,668 grade-school children tested in 1944, only 512 reacted; and of these, all but 17 who declined for such reasons as refusal of parents, were given X-ray inspection. Of the 495 inspected, only 68 presented X-ray evidence of calcium deposits, and 4, evidence of pleural adhesions. Had X-ray inspection alone been used and the assumption made that the 72 were tuberculous, only 14.5 percent of 495 with tuberculosis to some degree would have been recorded as having the disease, and the other 423 would have been overlooked. The total picture of conditions thus would have presented a fallacious aspect. Had morbidity and mortality rates been used exclusively as evidence, an even greater sense of false security would have been occasioned.

Jordan, using the same control methods, achieved the ultimate among school children in Minnesota. In 1930, 14.3 percent of the children in an appreciable number of schools reacted to tuberculin. In 1944, no child in these schools was a reactor. It could be said, in passing, that only the tuberculin test could have informed him that this goal had been attained.

The tuberculin test has been our best educational agent. It has given more usable information to more people than any other implement of tuberculosis work. When one has a characteristic reaction and perceives that others have no reaction, he apprehends that he differs from them—that he has something which they do not have. His curiosity is aroused; he immediately experiences a personal interest and manifests a desire for information. If the facts concerning the significance of the reaction are properly presented—if tangible evidence, in other words, is proffered—he is likely to act upon recommendations made for his welfare. One who does not react, on the other hand, can appreciate that he has escaped something that has overtaken the other. He is desirous of information regarding the prevention of tuberculous infection.

## THE X-RAY

In the tuberculosis control work in Minneapolis, X-ray film inspection of the chest was only resorted to in 1920 when symptoms or physical signs were present. This procedure was continued among the university students until 1929. When the work among children was begun in 1921, however, routine stereoscopic X-ray films of the chests of all children were requested, regardless of the presence or absence of symptoms, physical signs, or tuberculin sensitivity. X-ray observation in 1921 revealed findings that were almost unbelievable. Shadows, varying from those barely visible to those representing extensive disease in both lungs, appeared on the films of children and young adults who had seemed to be in excellent health. And even after this evidence was made available, abnormal signs could often not be elicited by the conventional examination. During the next few years, such observations were so frequent that it was concluded that examination of the chest was of little value without supplementary X-ray films. Efforts were made immediately to publicize, through journals, talks, and exhibits, the importance of this procedure in every chest examination.

During the first decade of the Minneapolis work, however, the excessive cost of X-ray inspection was recognized as an absolute deterrent to its use. Then in 1931 a photographic emulsion was placed on paper, forming a substitute for the cellulose film. Through use of the paper film, rapid exposing, developing, and reading was possible. In a single working day, more than a thousand exposures could be made with one machine, greatly reducing the cost of the finished product. A year later the work that had been done by this method was thoroughly investigated, and comparative studies, using persons in the Minneapolis survey, were made of the new paper and the cellulose film. All significant shadows on the cellulose films were as clearly seen on the paper ones. Because of its economy and potentialities, the paper film was immediately adopted and highly recommended.

The new method was soon applied to the production of photofluorograms—the 35-mm., the 4 x 10-inch, and finally, the 70-mm. size. All of these techniques have proved to be equally satisfactory in detecting and determining the extent of pulmonary lesions. The X-ray problem that seemed insurmountable in the twenties has been reasonably well solved.

During the first 10 years of the Minneapolis study, many physicians believed that most children were infected with tubercle bacilli, and that evidence of the primary lesions should be visible on X-ray films

of the chest. There was a tendency, therefore, among those who described films, without knowing the results of corresponding tuberculin tests, to report a disproportionate amount of calcification in the parenchyma, root region, or both. This resulted in a tremendous difference between the number reacting to tuberculin and the number reported to have X-ray evidence of calcium deposits. If all shadows so reported, and all tuberculin reactions, had indicated primary tuberculosis, the discrepancy would not have occurred.

It may be offered, by way of illustration, that of 1,412 cases described in 1925, 1,024 were said to present evidence of calcium deposits. Of these, only 45 percent reacted to tuberculin. Again in 1927, 2,816 cases out of 4,500 were said to present evidence of calcification; but only 1,569 of those with "calcium deposits" were tuberculin reactors. Two questions were asked: (1) Why do so many tuberculin reactors present no evidence of calcification? and (2) Why is so much evidence of calcification reported among nonreactors to tuberculin? Concerning the first, the following was offered:

The foci may be so small as to cast no shadow on the X-ray film, or they may be in some part of the chest not readily accessible to X-ray inspection.

Concerning the second:

There is the possibility that the interpretation is not correct in all of the cases. The calcification may be due to other causes than tuberculosis, and a tuberculous lesion resulting in calcification may become completely healed and sterilized so as to give no evidence of infection by the tuberculin test.

In 1927, McPhedran showed that round shadows may be cast by vascular trunks so directed towards the target that the primary ray is approximately axial, and that semi-oval shadows are often recorded when the plane of the curve of vascular trunks is directed slightly above or below the axis of the ray. Obviously, many persons reading X-ray films had been interpreting these vascular shadows as deposits of calcium. The error, it seemed, had occurred frequently in reports of the Minneapolis work, and in 1930 all of the previous films were reinterpreted.

In 1941, 5,968 children who had been nonreactors to tuberculin throughout the observation period were reported, as well as 4,377 who had been reactors. There was X-ray evidence of calcification in 1.2 percent of the former and in 27.6 percent of the latter. Neither coccidioidomycosis nor histoplasmosis is endemic in Minneapolis (though some persons from endemic areas immigrate), and apparently no other fungus infection results there in a significant number of

calcium deposits. There are other causes of pulmonary calcification, however, such as foreign bodies, which probably account for the majority of calcium deposits among the Minneapolis nonreactors and for a small percentage among the reactors.

The tuberculin reaction practically coincides with the results of careful post-mortem examinations both in human beings and animals. Primary lesions can be found, that is, in the body of nearly every tuberculin reactor, irrespective of the cause of death, if sufficient time and care are given to the examination. The wide discrepancy between tuberculin reactions and X-ray evidence of the presence of primary lesions in the living body has been explained by pathologists. Sweany offers the following:

(1) Many of the primary lesions of tuberculin reactors never attain such size or density as to cast visible shadows. Eight to twelve weeks after primary lesions are established, there is rarely X-ray evidence in more than 5 to 10 percent of the cases in which they exist. From 1 to 5 years later, however, enough calcium has been deposited in some of the lesions to cast shadows that appear on the films; but even this rarely occurs in more than 25 percent of the cases, and usually in much less.

(2) In approximately 25 percent of the lungs, primary lesions develop that are obscured by shadows of other structures, such as the heart or diaphragm.

(3) In an appreciable number of persons with primary tuberculosis (10 to 12 percent), the lesions have extrathoracic locations.

One would expect little correlation, therefore, between tuberculin reactions and X-ray evidence of the presence of primary lesions.

Among the Minneapolis children who reacted to tuberculin from 1921 to 1931, X-ray film inspection of the chest so rarely revealed evidence of significant disease in those under 12 to 14 years of age that its use upon young children was discontinued. To date, no reason for changing this procedure has been found.

During the first 10 years of the study, no significant disease could be detected on one film of the stereoscopic pair that was not equally discernible on the other. Stereoscopic film production was therefore discontinued, and single-film inspection has since been used.

The 10-year data also revealed that no phase of the examination had resulted in discovery of a single proved case of either primary or reinfection type of tuberculosis among nonreactors to tuberculin. From 1921 to 1941, 5,968 children who were nonreactors to tuberculin throughout the period were observed. In 95.6 percent, no evidence of disease of any kind was detected by X-ray film inspection of the chest, and in the remaining 4.4 percent, there was only evidence of pleural



changes, calcium deposits, and nontuberculous pulmonary disease. Among 4,377 reactors, on the other hand, only 58.1 percent had films that were entirely clear. The remaining 41.9 percent gave evidence of such pathologic conditions as pleural changes, primary lesions in the pneumonic or atelectatic stage, calcification, nontuberculous pulmonary disease, and pulmonary tuberculosis of the reinfection type. The unimportance of making chest X-ray films of nonreactors to tuberculin in searching for tuberculosis of any form, and the great importance of periodically making such films for all adult reactors, were further manifested by these observations. Chest X-ray inspection of nonreactors was discontinued.

The Minneapolis work has indicated that an extremely valuable use of the X-ray is in the periodic inspection of the chests of adult reactors to tuberculin—those who react upon first examination as well as those who become reactors later. Between 1921 and 1926, for example, 1,033 children who were reactors upon first examination were again observed. Fifteen, at the average age of 14 years, showed evidence of already having the reinfection type of pulmonary tuberculosis. Nine of these died at the average age of 20; in 1941 the 6 survivors were 26 years old. By that time, 41 others had developed pulmonary tuberculosis of the reinfection type. Two of these had died of tuberculous pneumonia in infancy, and the remaining 39 had shown evidence of chronic reinfection at the average age of 19. Of these, 14 died at the average age of 22; and the remaining 25, at an average age of 26, were still living in 1941. Of the 1,033 children first mentioned, there were 18 who, at first examination or later, gave evidence of the reinfection type of extrathoracic tuberculosis.

From 1921 to 1926, 216 children became tuberculin reactors. By 1941, 13 had developed pulmonary tuberculosis of the reinfection type, detected at the average age of 20 years. It was observed, throughout the period, that after the chronic reinfection type of pulmonary tuberculosis was first detected by X-ray shadow, 2 or 3 years usually elapsed before it evolved to such proportions that symptoms appeared, stethoscopic findings were present, or tubercle bacilli were found in the sputum. This again emphasized the great importance of periodic X-ray inspection of the chests of all adult tuberculin reactors. Beyond a doubt, the high mortality among the earlier cases was due, in part, to insufficient X-ray inspection of their chests, and it was accordingly recommended that the interval between X-ray inspections never exceed 1 year.

In the Minneapolis work, a considerable number of adult tuberculin reactors have recently been seen who at first present clear X-ray films of the chest, but within a year show evidence of moderately or far advanced disease. When inspection was made for reasons such

as symptoms, surveys, etc., extensive disease was found in some cases within 3 to 6 months after clear chest films were observed. Apparently this occurs in a minority of tuberculin reactors who develop the chronic reinfection type of pulmonary tuberculosis as a result of bronchogenic spread from lesions of the previously existing primary complexes. It now appears, however, to be a sufficiently large minority to suggest strongly that annual X-ray inspections of the chests of adult reactors are inadequate, and that inspections should be made at least every 6 months. In the Minneapolis area, the number of adults who react to tuberculin has become so small that such inspection is a physical possibility.

At the beginning of the Minneapolis work, it was held that all who were to develop clinical tuberculosis would do so in early life. Observation has shown, however, that demonstrable clinical lesions develop in tuberculin reactors of any age. The futility of setting an age limit, such as 25 years, for discontinuing periodic X-ray inspection of the chest is therefore obvious. These inspections should be continued, regardless of age, as long as the person reacts to tuberculin.

Although the great value of X-ray inspection of the chest was early recognized, enthusiasm for this phase of the examination was never allowed to outrun judgment. It was obvious that the X-ray had serious limitations, and that it was just as important to establish facts concerning them as concerning its advantages. Data on all phases of the examination, accumulated for 10 years, were analyzed. The results showed that a good many persons who had been diagnosed as tuberculous because of chest X-ray shadows did not have pulmonary tuberculosis, but had, instead, other pulmonary pathologic conditions that produced shadows indistinguishable from those cast by tuberculous lesions. The number of such cases was so large that the observers were convinced that X-ray shadows were never pathognomonic.

It was strongly recommended, therefore, that no one—roentgenologist, pediatricist, internist, surgeon, or chest specialist—attempt to diagnose any pulmonary pathologic condition by X-ray. It was further recommended that those reading films limit themselves to describing shadows with reference to location, extent, etc., and then list the conditions that might have resulted in the shadows. And it was pointed out that actual diagnosis could only be made by other phases of the examination—that it was enough for the X-ray to supersede other investigative procedures in locating areas of disease. To attempt to carry the X-ray beyond this point is to enter the field of speculation in diagnosis. Moreover, to attempt to determine the activity of proved tuberculous lesions by a single X-ray shadow is preposterous. In the years following the demonstration, no evidence has been adduced to change this opinion.

## DETERMINING ACCURATE DIAGNOSES

In 1921, symptoms such as marked loss of weight, anemia, and fever played an important role in the diagnosis of tuberculosis among children. X-ray shadows and physical signs, such as rales and those thought to indicate the presence of large lymph nodes at the roots of the lungs, particularly d'Espine's sign, were given much consideration. Little attention was paid to evidence elicited by the tuberculin test, and diagnoses were often based upon rales or X-ray shadows in nonreactors. Long observation revealed that such diagnoses were never correct. Lesions thought to be tuberculous proved to be the result of conditions such as bronchiectasis, abscess, and unresolved pneumonia.

In Minneapolis the tuberculin test was administered routinely from the first, and all were given stereoscopic X-ray inspection of the chest, regardless of the tuberculin reaction. In addition, a number of special procedures were included. Data were assembled that later proved of extreme value in determining the efficacy of the various diagnostic methods.

Although a characteristic tuberculin reaction is sufficient to justify a definite diagnosis of the primary type of tuberculosis, it gives no information as to the presence or absence of the reinfection type. But since this type develops only in persons who are sensitized to tuberculo-protein, it is obvious that any lesion demonstrated in the body of a tuberculin reactor may represent this type of disease. That a person reacts to tuberculin is not proof, of course, that a given lesion is tuberculous: nontuberculous pulmonary lesions are as likely to develop in the bodies of reactors as in those of nonreactors. Hence, the tuberculin test serves only to identify persons with primary tuberculosis who may, at the time of testing, have the reinfection type of disease, or may subsequently develop it. This, in itself, is a definite requisition for other procedures in examination.

X-ray inspection of the chest constitutes but one of these procedures. When lesions are sufficiently large and dense to be regarded as evidence of gross pathologic processes, they absorb X-rays so as to cast shadows on sensitized film. But the shadows, it should be emphasized, are not pathognomonic: one cannot determine whether they represent tuberculous or nontuberculous lesions. Hence, the X-ray denotes those persons with gross pulmonary disease, but does not determine its etiology. By chest X-ray shadows alone, it is impossible to differentiate new primary lesions from those of the reinfection type. Only when the duration of the sensitivity to tuberculo-protein is known is such a differentiation immediately possible.

Calcification revealed by chest X-ray films of nonreactors to

tuberculin is almost never due to tuberculosis except in an undetermined percentage where all tubercle bacilli in the body have died and the allergy has disappeared. The recent work of Aronson, Palmer, and Christie has revealed that in certain parts of the country, the long-suspected fungi are responsible for far more of the calcium deposits in human bodies than is the tubercle bacillus. This is true in the areas where coccidioidomycosis and histoplasmosis are endemic. Tests specific for tuberculosis, coccidioidomycosis, histoplasmosis, etc., are therefore essential in diagnosis. It is also true that not all calcareous deposits in tuberculin reactors are due to tuberculosis. The deposition of calcium is not a specific process, and therefore evidence of calcification found in chest X-ray inspection never justifies a diagnosis of any disease.

When a lesion is found in a tuberculin reactor through the shadow it casts, its etiology must still be determined. Symptoms and signs elicited by the conventional physical examination are not pathognomonic; when due to pulmonary tuberculosis, they are usually not in evidence until the disease has reached an advanced stage; and therefore symptoms and conventional physical signs are of little value in differential diagnosis.

Like the tuberculin reaction, the recovery of tubercle bacilli is specific for tuberculosis. This is not true of evidence obtained by any other procedure in the examination. When a tuberculin reaction denotes the presence of tubercle bacilli, our immediate concern is whether they are being liberated from the suspected lesion, constituting a hazard to the infected person and his associates. In the Minneapolis work, gastric lavage has been employed with considerable success upon failure to find acid-fast bacilli in the sputum, or in the absence of sputum. Pulmonary lavage, however, though said to be harmless, has not been used. The examinee's body is inspected for draining sinuses, and if found, the discharges are searched for acid-fast bacilli. Examinations of feces for bacilli have occasionally been made.

In the early years of the Minneapolis work, the recovery of acid-fast bacilli was regarded as *prima facie* evidence of tuberculosis. Errors in diagnosis resulted, however, for the following reasons:

- (1) Some acid-fast bacilli are nonpathogenic saprophytes.
- (2) Containers, though sterilized, may retain dead tubercle bacilli from previous specimens if the proper methods are not used to insure their disintegration.
- (3) Laboratory mistakes occur, such as mislabeling and confusing of specimens, as well as improper identification.

Hence, in questionable cases, only a presumptive diagnosis is made

when acid-fast bacilli are found, and the final judgment awaits the evidence of culture, or better, of animal inoculation.

Failure to discover tubercle bacilli in any suspected case does not prove their absence. Perseverance may result in their disclosure weeks or even months after the search is begun.

Serial X-ray film inspections of lesions are helpful when tubercle bacilli cannot be recovered. Lesions that produce shadows thought to represent tuberculosis often prove to be due to acute infections, which may disappear promptly; and in such cases, films made 1 month later are usually clear. Infections of this kind were apparently responsible for 10 to 15 percent of the rejections for military service in World War II.

The Minneapolis observations have revealed that many lesions found by X-ray among adults have neither receded nor progressed, as far as can be determined by shadows, throughout the observation period. This finding, in the absence of other evidence, strongly suggests stability; and if a diagnosis of tuberculosis is justified (such lesions are often nontuberculous), the disease may be classified as arrested or apparently cured. Again, shadows on serial films may show evidence of decrease or increase in size, as well as of persistence, thus indicating instability. When such shadows are due to tuberculous lesions, there may be a total absence of symptoms; but if they are due to such conditions as unresolved pneumonia, abscess, etc., the final diagnosis is assisted by evidence of toxemia, blood findings, etc.

Among adults, particularly those over 35 years of age, there is enough likelihood that a recently discovered pulmonary lesion is malignant to suggest that waiting for a long series of films would be dangerous. If the shadow does not disappear promptly, the bronchoscopist should always be consulted. "X-ray diagnosis" in the early years sometimes resulted in failure to diagnose malignancy until it was widespread. Bronchoscopy, skillfully performed, does no harm, and in many cases results in accurate diagnoses, which are impossible in its absence.

As diagnostic evidence, the red blood cell sedimentation rate has not been especially efficacious among the Minneapolis examinees. It has often been found to be within normal limits in persons with recent, sizeable primary and reinfection type of tuberculous infiltrations. When the rate is accelerated, one may question its importance, inasmuch as it is not pathognomonic. It has been found of considerable value, however, in observing the course of disease in well-established cases when other conditions have, as far as possible, been ruled out. As differential leucocyte counts are not pathognomonic, they have not been taken routinely in the Minneapolis work.

The futility of making a diagnosis of tuberculosis in the absence of

a tuberculin reaction or a recovery of tubercle bacilli has been emphasized. This practice has always led to incorrect diagnoses. The only results of the examination that give specific information are demonstrations of a sensitivity to tuberculin and of the presence of tubercle bacilli. Evidence obtained through all other procedures permits only speculation.

#### SURVEYS

The manifest value of stereoscopic chest X-ray inspection of apparently healthy persons occasioned a provision, in 1922, whereby all of the 2,000 students in a Minneapolis high school were offered this service without charge. It was expected that chest lesions would be brought to light, and that physicians would then be convinced of the need for chest films of all apparently healthy adults. The school officials approved the survey; it was widely announced and encouraged. But unfortunately, the time was not ripe. The idea was belittled by many persons, including some physicians. Not enough educational work had been done to dispel the old prejudices or to convince physicians that X-ray inspection of the chest is more valuable in determining the location and extent of pulmonary lesions than any other procedure of the physical examination. Only a small number of the 2,000 students availed themselves of the opportunity. Although the response was discouraging, enthusiasm was not dampened—nor could it have been by any amount of opposition. Evidence of the efficacy of this procedure continued to accrue.

The second special tuberculosis survey was begun in 1933, when an adequate examination of all employees for tuberculosis was made mandatory by the Minneapolis Board of Education. The examination consisted of a tuberculin test, X-ray film inspection of all reactors, and a complete follow-up of those who presented shadows that might have resulted from tuberculosis. X-ray films of the chest were required of those who had recently been tested with tuberculin and of those who refused the test. Had the examination been voluntary, some of the persons found to have clinical tuberculosis would not have been examined, as they were among those who strongly opposed the procedure on grounds of legality, personal liberty, and so forth. Of the 3,602 members of the personnel, only one, who resigned, escaped the examination; whereupon it was discovered that she had known for several years that she had infectious pulmonary tuberculosis. She had been employed to prepare food for high school students.

Other surveys, in recent years, have consisted in the administration of tuberculin tests to high school students and in the subsequent inspection by X-ray of those who accepted investigation, regardless of

the tuberculin reaction. A recent survey of personnel of the school system consisted only of making chest films of those who volunteered, and free chest X-ray inspection has been offered in two or three districts of Minneapolis. In none of the recent surveys has the desired number of persons been reached.

The mass survey of school personnel in 1933 and 1934 has been the only satisfactory one to date: it reached everyone. This represents a goal that must be obtained, or nearly so, in any survey that is to be satisfactory. By adequate education and a suitable approach to all citizens, it can be attained.

The work among the 19,000 or so children and 10,000 adults, under observation between 1921 and 1941, and among the 50,000 or so students entering the University of Minnesota between 1928 and 1946, has constituted by far the best survey conducted in the city of Minneapolis. If the X-ray films of these thousands of persons were to be inspected without knowledge of the results of the work, the information derived would be meager. There would be no indication of how many, or of which ones, had primary lesions; and it would be impossible, even, to determine with accuracy which of those with gross lesions had tuberculosis. If the same observers, on the other hand, were to review the complete records—taking into consideration the results of tuberculin tests, X-ray films, and clinical and bacteriological examinations—they would form a true concept of the tuberculosis situation in the groups under observation from year to year.

Facts were established through this procedure that could not have resulted from any other. From 1921 to 1941, for example, 1,011 children were observed who reacted characteristically to tuberculin between birth and 5 years of age. Fourteen (1.38 percent) died from acute reinfection type of tuberculosis; six, from meningitis; five, from generalized miliary disease; and three, from tuberculous pneumonia. Thirteen others (1.29 percent), of whom none died, developed extrathoracic reinfection type of tuberculosis—e. g., bone and joint lesions. Hence, only 27, or 2.7 percent, developed significant clinical lesions in childhood. These observations indicate that at least in this community, infection with tubercle bacilli in infancy and early childhood is well tolerated.

Of 2,979 children, from 6 to 14 years of age, who reacted to tuberculin at the time of the first examination, none gave a history of illness or became ill from the primary lesions. During this age period, extrathoracic lesions of the reinfection type were already present or became demonstrable in 36 instances, and chronic pulmonary tuberculosis of the reinfection type was present in 30. The majority of

chronic pulmonary lesions was found in those between the ages of 12 and 14.

Of the many persons observed in the Minneapolis work, more than one thousand adults—mostly students of nursing and medicine—have developed primary tuberculosis while under observation. They have tolerated the first infection type of tuberculosis as well as have those infected in childhood; and moreover, they have not developed, subsequently, significant chronic reinfection type of tuberculosis to a greater degree than have those who entered the observation group as tuberculin reactors. The theory propounded in 1920, therefore—that a first infection postponed to adulthood is exceedingly hazardous—is untenable in Minneapolis. Effort to prevent children from becoming infected with tubercle bacilli is sound practice in tuberculosis control: the longer infection is postponed, the better—in the individual or in the community.

#### TREATMENT OF TUBERCULOSIS

When the studies on children were begun in 1921, practically no differentiation as to treatment was made between the first infection and the reinfection type of tuberculosis. The vast majority of diagnoses were made when symptoms caused persons to seek examination. These were mostly adults. Of those whose symptoms were found to be caused by tuberculosis, 80 to 90 percent had the disease in an advanced stage, and for the most part were infectious. When shadows of tuberculous lesions were seen in children and young adults who were apparently in excellent health and at the time, presented no other evidence except the tuberculin reaction, it was assumed that the majority of these lesions represented clinical disease that would progress, causing illness and death, if not promptly and adequately treated. In those days, treatment consisted largely of rest in bed, either in the home or in an institution. Artificial pneumothorax was not in general use in Minneapolis, and no one had been treated by chest surgery. As the years passed, the fact became apparent that all reactors to tuberculin have lesions of the primary type, determinable as to location in only a small percentage during life.

The Lymanhurst School for Tuberculous Children, with a capacity of 175, was recommended for those who were anemic, below weight, or who presented evidence of calcium deposits, etc. It was thought that special care in such an institution would aid in so controlling the lesions that they would be harmless in adulthood. A much larger number of children with such conditions, who could not be accorded this privilege because of the limited capacity, served as controls. After the school had been in operation for 13 years, the data were



analyzed. Surprisingly enough, the children who had remained at home with no treatment other than attempts to prevent exogenous reinfection had fared as well as those treated in the school.

Two hundred and twenty other children were observed while their primary tuberculosis was in the pneumonic or atelectatic stage. Sanatorium care was strongly recommended, despite the fact that the children were ostensibly in excellent health. Some families accepted this recommendation; others refused. To the latter, the Lymanhurst School was offered, but this was also declined by some. The children were thus divided into three groups: those who were treated in a sanatorium, those in a special school, and those who remained at home. An unusual opportunity was afforded to observe, under three different conditions, the course of the disease and the response to treatment.

No difference could be found among the lesions of the three groups when these children were later seen. Those who received strict bed rest had fared no better than those in the special school, who in turn showed no advantage over those who remained at home: the course of the disease was the same, whether little or much was done. In due time, all of the pneumonic and atelectatic lesions had so diminished in size that they could not be detected by X-ray film inspection. Often this required 2 or 3 years. In some cases, calcium deposits subsequently appeared at the site of a previous lesion, in the regional lymph nodes, or in both locations; while in others, the chests remained entirely clear. It was impossible, moreover, to observe any difference in the incidence of development of the reinfection type of tuberculosis among the three groups of children when they attained adulthood. Those who were treated, as children, in a sanatorium were just as likely to develop the reinfection type of disease in adult life as those who remained in their homes or in the special school.

Thus, the problem of treating children affected with primary tuberculosis—one that seemed of great magnitude at the start of the work—was found to be no problem at all. This was also true among the university students with primary tuberculosis, regardless of the stage of development of the disease. It was therefore recommended in 1933 that all aspects of treatment of the first-infection type of tuberculosis among children and young adults be discontinued—that the funds allocated for this purpose be used to test much larger numbers of children with tuberculin, in a search for the source of infection of the reactors, and to examine annually the chests of all reactors upon attainment of adulthood. Subsequent observation has resulted in no evidence to show that the primary type of tuberculosis, either in children or in adults, requires treatment. There are two important procedures, however, to be followed for everyone found by the

tuberculin test to have tuberculosis, regardless of X-ray shadows: (1) prevent exogenous reinfection, and (2) examine annually all who have attained adulthood, including always X-ray film inspection of the chest.

In Minneapolis, experience in treating the reinfection type of pulmonary tuberculosis has been the direct opposite of that in treating the primary type. Although many persons recover spontaneously, the percentage in whom the reinfection type progresses to incapacitating and killing proportions is too high to permit taking the risk involved in not treating a given active lesion. Serious injustice could result from a recommendation of treatment for every lesion found on the first examination, as many of them, regardless of size, have long since been controlled by the body defense mechanism, and therefore require no treatment whatever. Unfortunately, this status usually cannot be determined except by an extended observation.

As age advances, there is an accrual of minimal lesions that have come under control. These may be of long standing. Hence, not all minimal lesions are early. And on the other hand, not all early lesions are minimal. Indeed, a considerable number of lesions are moderately or far advanced when first detectable.

To find lesions as early as possible and to treat them immediately has been a major objective in the Minneapolis work. Only in cases where evidence of infection is limited to the tuberculin reaction can we be sure that a given lesion is early. Only in such cases can there be a subsequent development of the reinfection type of tuberculosis. If these cases are reexamined at sufficiently close intervals (every 6 to 12 months), pulmonary lesions in those who develop them will be found relatively early, when the majority are minimal. A minority will be in an advanced stage. Such cases rarely have symptoms or are infectious when found, and frequently prompt and adequate treatment prevents them from falling ill or becoming contagious. For more than 20 years, such cases have been treated successfully in Minneapolis with ambulatory artificial pneumothorax. When this is not indicated because of extent of disease, temperament, or other reasons considered valid, hospitalization has been recommended as in all cases of active tuberculosis.

Every community should have a bed for each infectious case. Tuberculosis cannot be controlled if tubercle bacilli are allowed to disseminate in the home or community. The protest is often made that it is pointless to conduct tuberculosis surveys because beds are not available for the contagious cases found. This is intolerable. All infectious cases should be located, regardless of bed shortage. A statement of the actual number of beds needed is the strongest argument in requesting them. And moreover, while beds are being

procured, at least partial isolation can be arranged for many persons in their homes. A considerable number can be rendered noninfectious by collapse therapy, particularly artificial pneumothorax.

It is believed that the most important factors in improving the tuberculosis situation among children and young adults in the Minneapolis area have been the prevention of cases of clinical tuberculosis from becoming infectious, the isolation of those who are infectious, and the eradication of tuberculosis from cattle.

For several years the most troublesome problem has been among students of nursing and medicine. In one Minneapolis hospital, however, a very effective contagious-disease technique has been developed. The medical students have been protected against contagion to such a degree that the number of infections contracted while in school has been markedly reduced, and for more than 3 years not one case of clinical tuberculosis has developed among the students.

The tuberculosis-control program in the city of Minneapolis has developed slowly but constantly over the past quarter of a century. Every promising procedure that has been suggested anywhere in the world has been tried. Those found to be impractical or of little value have been discarded, and those that could be used to advantage, retained. Awkward and short-cut methods have been discouraged. The results have been a decrease in morbidity, as attested by the fact that 750 beds were needed in the county sanatorium 12 years ago and that, at present, there are 150 to 200 beds vacant; a decrease in the mortality rate, from 120 per 100,000 in 1920 to 27.1 in 1945; a decrease in the incidence of primary tuberculosis among grade school children, from nearly 50 percent in 1926 to approximately 8 percent in 1944; a contrasting annual infection attack rate among young children—3.5 percent in 1926 and 0.003 percent in 1944; and a decline in mortality among children up to 5 years of age, from a high rate in 1920–30 to not a single death from tuberculosis in 1945.

With a fundamental program of proved effectiveness, a complete solution of the tuberculosis problem in Minneapolis could be promptly achieved. That it is necessary to maintain a 3-million-dollar sanatorium costing three quarters of a million dollars a year to operate is absurd. In a single decade, the required number of sanatorium beds could be reduced to 100; the mortality rate, to less than 10 per 100,000. Children with primary tuberculosis, as manifested by the tuberculin reaction, would be almost curiosities. And within the second decade, tuberculosis could be reduced to the irreducible minimum. Present knowledge, equipment, and workers, combined with an intelligent public, are all that is needed to organize, to begin work, and to persevere.

Inexpensive X-ray inspection of the chest of each adult would reveal practically everyone who, at the time, has infectious tuberculosis. The number of such persons in Minneapolis would not be as large as many suspect—probably less than 300. With their removal to hospitals and sanatoria, some would be restored to good health, and infection removed from the city. The tuberculin test would then detect promptly all remaining persons with primary tuberculosis, of whom the total number would probably not exceed a fourth of the entire population. The other three-fourths, as well as those who subsequently migrate to the city, should have the test at least every 2 years, and preferably annually. Those who react to tuberculin on first testing, and those who are later found to be reactors, should have thorough annual examinations, including X-ray inspection of the chest; and those who have developed the reinfection type of tuberculosis should be treated at once, and isolated in hospitals and sanatoria if the disease becomes infectious. The responsibility for these accomplishments lies with those in charge of the public health. Failure to achieve them—failure to control completely, and ultimately to eliminate tuberculosis—is unpardonable.

## THE PERSISTENCE OF FLUOROSCOPIC SCREENS<sup>1</sup>

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The luminescence produced in phosphors by excitation with visible light, ultraviolet or X-rays has long been recognized as consisting of emission of two distinct types: (a) fluorescence during excitation, and (b) phosphorescence after the exciting radiation has been cut off. These two types of luminescence differ from each other both in the mechanism by which they are produced and in their characteristics of wave length and duration. Phosphorescent emission is of longer wave length than fluorescent emission and phosphorescence last for an appreciable time after termination of the exciting radiation, whereas fluorescence occurs only during excitation or, at the most, only a few microseconds thereafter. The mechanism of these phenomena has been discussed by Mott and Gurney (1), Hirschlaff (2), Riehl (3), and others.

In the case of phosphors used in X-ray intensifying and fluoroscopic screens, the characteristics of the phosphorescent emission are of interest especially in regard to the time during which this light emission persists and the rate at which its intensity falls off. The delay in returning to the dark state is generally termed the "lag" or "persistence" of the screen. It is well known that screens of different

<sup>1</sup> From the Electronic Laboratory, Radiology Section, Tuberculosis Control Division, United States Public Health Service.

types as well as different screens of the same type exhibit wide differences in persistence. For example, the green-fluorescent screens such as the Patterson type B have an extremely short period of phosphorescence, whereas the blue-fluorescent screens show an enormous range of persistence, from a very short period in some phosphors to a time so long as to render them almost useless.

In many applications, a fairly long persistence offers no disadvantage or may even be intentionally utilized to advantage. On the other hand, in photofluorography or in high-speed radiography, where pictures are taken in rapid succession, screens with a long persistence cannot be used satisfactorily. Even when the persistence of a screen is within the limits of tolerance for a single exposure, the phosphorescence "builds up" during successive exposures until it reaches values many times greater than that after a single exposure. This accumulated persistence is of particular importance in connection with exposures which follow each other in rapid succession, as in chest X-ray survey work, since the increasing amount of light due to phosphorescence produces pictures of decreasing contrast. Furthermore, where the exposures are controlled by a photoelectric timer, this persistent phosphorescence causes the successive exposures to be prematurely terminated. This results in pictures being underexposed as well as lacking in contrast.

In order to study quantitatively the phosphorescent characteristics of fluoroscopic screens and to compare the persistence of various commercial and experimental screens, the following method was devised. A photoelectric cell of the multiplier type was arranged to receive the light emitted by the screen under examination. The output current of this tube was fed to the galvanometer string of an electrocardiograph which served as a recording microammeter. The electrocardiograph was used as a recording device merely because it was available and served the purpose, but obviously any other device of comparable sensitivity, such as a recording oscillograph, could have been used as well. Since the intensity of the light emitted by the screen during excitation is several thousand times that emitted during the period of phosphorescence, a relay was provided to decrease automatically, by a known amount, the sensitivity of the recording element during exposure. This enables the recording of the light intensity during exposure and also gives maximum sensitivity for recording the much smaller intensities of phosphorescence. The circuit is shown diagrammatically in figure 1, and a typical recording is reproduced in figure 2.

Using the apparatus described above, curves are readily obtainable showing the rate of decay of phosphorescence of screens under any desired conditions of exposure. In studying the characteristics of

screens adaptable to photofluorography, for example, exposures were made of 0.1-, 0.25- and 1.00-second duration at 85 kv. (peak) and 100 milliamperes through a phantom of 10 cm. of Masonite presdwood.<sup>2</sup>

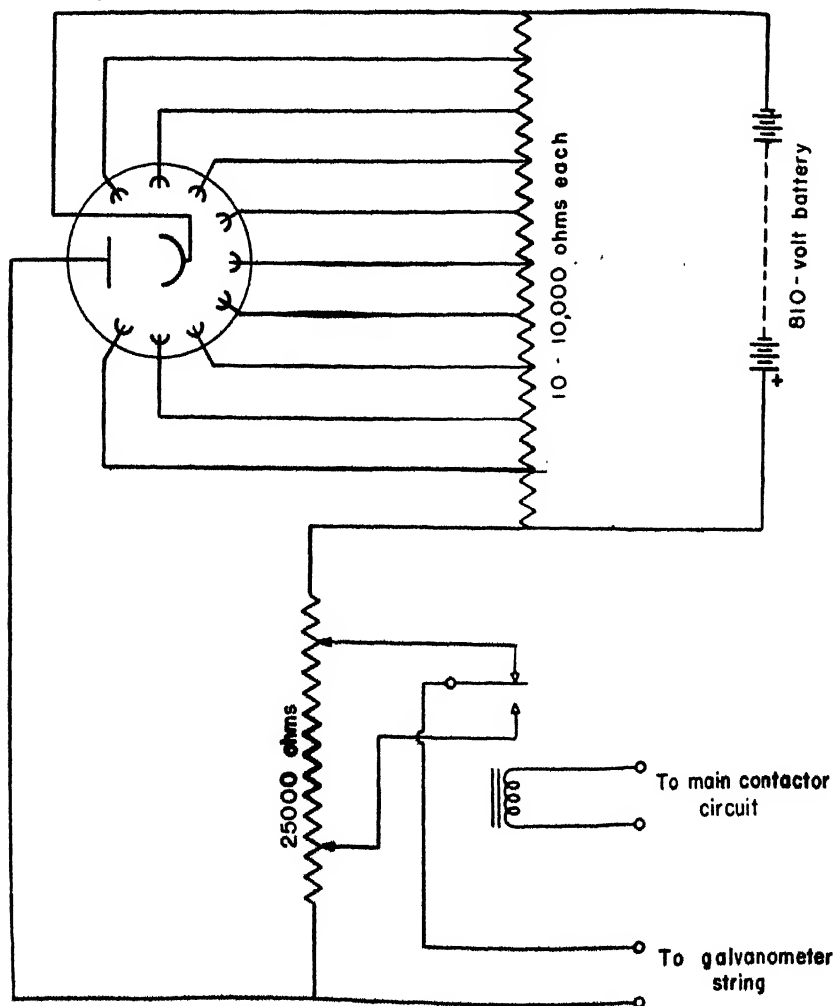


FIGURE 1.—Schematic diagram of circuit used to measure phosphorescent lag of fluoroscopic screens.

The resulting curves for four different screens are shown in figure 3 from which the very great differences in behavior of screens is readily apparent, and a means of comparison of one screen with another is easily afforded. In each set of curves, *A* represents the decay of phosphorescence after a 0.1- second exposure; *B*, after a 0.25- second

<sup>2</sup> A phantom composed of 10 cm. of Masonite presdwood has been shown by Chamberlain to be equivalent to the average chest. See Chamberlain, E. W.: Fluoroscopes and Fluoroscopy. Radiology, vol. 38 (April 1942).

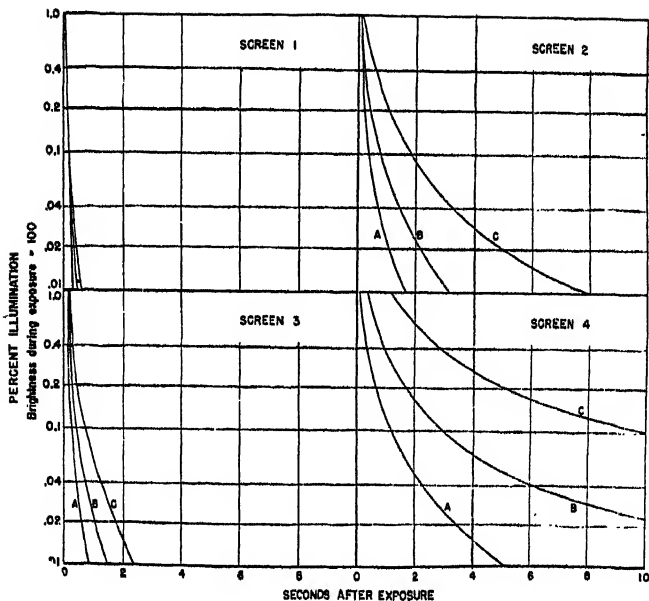


FIGURE 3.—Curves showing decay of phosphorescence for four different screens. *A*, after 0.1-second exposure; *B*, after 0.25-second exposure; *C*, after 1.0-second exposure. All exposures made at 85 kv. (peak) and 100 milliamperes, through a phantom of 10 cm. of Masonite presdwood. Screen 1, Patterson type B; screen 2, Patterson type D; screen 3, U. S. Radium Corp. 686D; screen 4, U. S. Radium Corp. 574A.

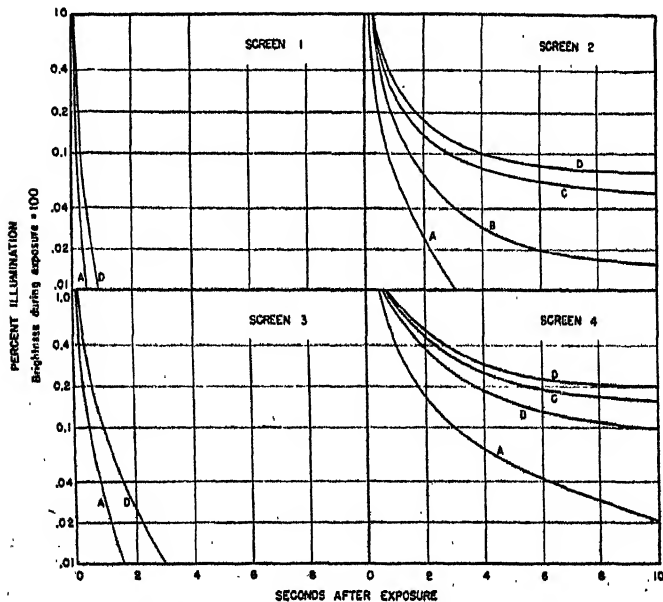


FIGURE 4.—Curves showing decay of phosphorescence after successive exposures. *A*, after a single exposure; *B*, after one exposure per minute for 1 hour; *C*, after two exposures per minute for 1 hour; *D*, after three exposures per minute for 1 hour. All exposures made at 0.25 second, 85 kv. (peak), 100 milliamperes, through a phantom of 10 cm. Masonite presdwood. Screen designations the same as in figure 3.

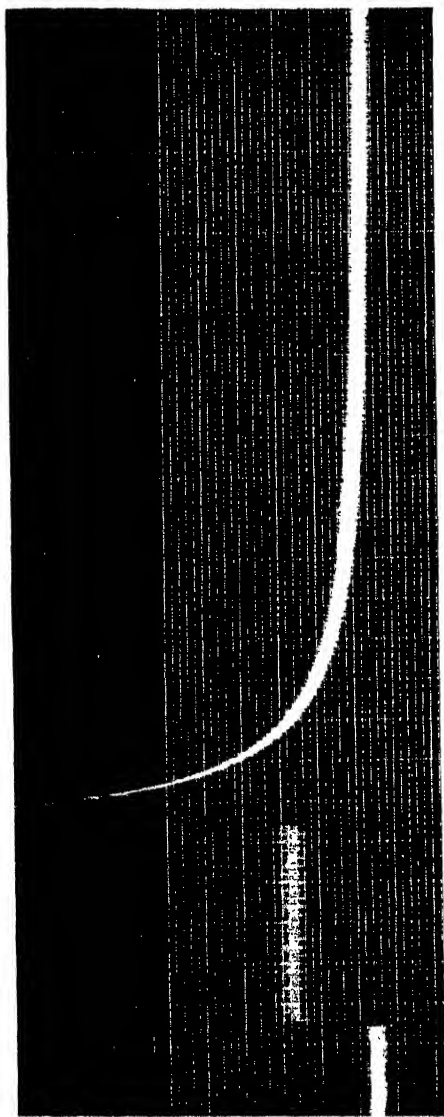


FIGURE 2.—Typical record of the decay of phosphorescence as recorded on an electrocardiograph.





exposure, and *C*, after a 1.0- second exposure, all exposures at 85 kv. (peak), 100 milliamperes, and through a phantom of 10 cm. of presdwood. Screen 1 is a Patterson type B green-fluorescent screen and shows the very short lag characteristic of this type of screen. Screens 2, 3 and 4 are blue-fluorescent screens and illustrate the wide range of persistence encountered in screens of this type. Screen 2 is the Patterson type D screen, and screens 3 and 4 are two experimental screens submitted by the United States Radium Corporation and designated as 666D and 574A, respectively. It is instructive not only to note the time required for the phosphorescence to fall to a particular fraction of the original brightness, but also to compare the slopes of these curves at that value. For example, the phosphorescence in screen 3 not only requires a short time lapse to decay to 0.01 percent of the original brightness, but it is still falling off rapidly at that point. The other blue-fluorescent screens, 2 and especially 4, not only require a longer period of time to decay the same amount, but also show a much slower rate of decay, indicative of the fact that phosphorescence of low intensity will continue for some time.

The effect on persistence of repeated exposures at different rates over a period of 1 hour is shown in figure 4 for the same screens. Again the very great difference in behavior of different screens is clearly evident. Curve *A* shows the decay of phosphorescence after the first exposure of 0.25 second at 85 kv. (peak), 100 milliamperes, and through a 10 cm. phantom of presdwood. Curves *B*, *C* and *D* show the decay after a series of similar exposures for 1 hour at the rate of one, two and three per minute respectively. Here again the slopes of the curves are interesting. In the green screen 1 and the blue screen 3, the accumulated persistence is small and falls off rapidly, whereas in blue screens 2 and 4, the accumulated persistence is great and falls off very slowly. Indeed, further measurements showed that persistence, such as illustrated by curves *D* in screens 2 and 4, lasted many minutes with a very gradual rate of decay and was still evident after several hours. Thus, for exposures in rapid succession, screens such as 2 and 4 never completely recover between exposures, with the resulting unfavorable effect on contrast mentioned above. On the other hand, screens such as 1 and 3 recover completely even between exposures 20 seconds apart. This is shown in figure 5, which shows the phosphorescence at the beginning of successive exposures made under the same conditions as above and at a rate of three per minute. Here the complete recovery between exposures of screens 1 and 3 is shown by the horizontal line, while the increase in phosphorescent lag in screen 2 is shown by the curve.

The four screens reported above all have comparable speeds and resolving power, as shown on table 1. Hence the results indicate that

from the standpoint of persistence alone a wide choice is possible. By careful selection of a screen with regard to the use to which it is put, many of the difficulties encountered because of persistence would seem to be resolvable.

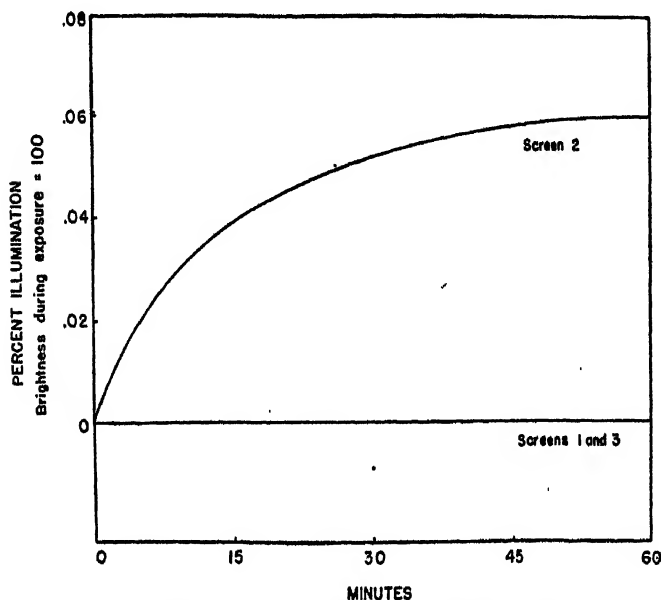


FIGURE 5.—Curves showing phosphorescence at the beginning of successive exposures made at the rate of three per minute. All exposures made at 0.25 second, 85 kv. (peak), 100 milliamperes, through 10 cm. of Masonite presdwood. Screen 1, Patterson type B; screen 2, Patterson type D; screen 3, U.S. Radium Corp. 666D.

TABLE 1

Screen number and type	Relative speed	Resolving power (lines per mm.)	Screen number and type	Relative speed	Resolving power (lines per mm.)
1 Patterson B.....	90	6	3 U. S. Rad. 666D.....	90	9
2 Patterson D.....	100	7	4 U. S. Rad. 574A.....	120	8

## REFERENCES

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- (3) Riehl, Nickolaus: *Physik und technische Anwendung der Lumineszenz*. Berlin, Springer, 1941 (in *Technische Physik*, Bd. 3). Published by license of the Alien Property Custodian by J. W. Edwards and Edwards Bros., Inc., Ann Arbor, Michigan, 1945.

## Excerpt from

**BIOLOGICAL ASPECTS OF INFECTIOUS DISEASE <sup>1</sup>**

"There are going to be some interesting and difficult problems in regard to tuberculosis in the relatively near future. With the diminution in the number of frank infections and the increasing isolation of patients in sanatoria, an increasingly large number of people will reach adult life without coming into contact with infection. Droplets of mucus containing tubercle bacilli are not nearly so common in city air now as they were 50 years ago. This would be all to the good were it not for the increased danger of tuberculosis when it attacks a completely nonimmune adult. Experience with native races has shown that nonimmune adults are by no means bound to develop serious tuberculosis as a result of infection. Under good environmental circumstances, most will escape, but if under stress of any sort the disease does develop, it is much more likely to be fatal than in one who has been through a childhood infection. It may become necessary therefore to develop some form of vaccination against tuberculosis to replace the normal childhood infection. It might even be more logical to start doing so at once, in the hope of avoiding that proportion of primary infections which develop into fatal illness."

**NORTHERN IRELAND TUBERCULOSIS ACT <sup>2</sup>**

A new Public Health (Tuberculosis) Act was passed by the Parliament of Northern Ireland on February 28. Under it, a tuberculosis authority was set up which met for the first time on April 8 and is already a going concern. "Of its members, four are nominated by the Belfast county-borough council, two by each of the county councils of Antrim and Down, one by the Londonderry county-borough council, one by each of the county councils of Armagh, Fermanagh, Londonderry, and Tyrone, and four by the minister of health. The authority has the right to coopt one or two additional members. At present its only medical member is Dr. W. J. Wilson, professor of public health and hygiene in the Queen's University, Belfast.

The chief duties of the tuberculosis authority are to provide accommodation for people suffering from tuberculosis, including their general care and maintenance during treatment, and their care and readjustment after treatment; to discover fresh cases, and prevent spread of the disease; to educate patients and public in treatment and prevention; and to improve medical and nursing training in tuberculosis.

<sup>1</sup> By F. M. Burnet, Cambridge (1940) pp. 262-268.

<sup>2</sup> From *The Lancet*, London, No. 6401, vol. CCL, May 4, 1946, page 671.

Notification of tuberculosis in any form has become compulsory; and when a doctor sends in a prescribed form stating that a patient has a primary, complex or any significant tuberculosis condition, the authority will arrange for the patient to be "medically examined for the purpose of diagnosis" without charge. The authority has powers to require any contact to submit himself for examination by an approved medical officer. If an infectious person cannot be segregated safely in his own home the authority will be able to apply for a court order to have him removed to a hospital and detained there for not more than 3 months—a period which can be extended by the court to 6 months if the authority shows that the conditions which led to the patient's detention would be reproduced if he returned home. Where such an order has been made, the authority will, if directed by the court, pay all or part of the costs of hospital care and contribute to the maintenance of dependents.

The authority has powers to acquire, improve, equip, and maintain buildings, to provide medical, nursing, dental, and other treatment, to provide laboratories for research into the disease, and to develop a health center or colony. Capital expenditure of the new authority will be borne by the Government, maintenance costs being shared by the Government and local authorities.

## PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

September 8—October 5, 1946

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended October 5, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941-45.

### DISEASES ABOVE MEDIAN PREVALENCE

*Poliomyelitis.*—The number of cases of poliomyelitis dropped from 7,129 during the 4 weeks ended September 7 to 5,488 during the 4 weeks ended October 5. The number was 1.7 times the 1945 incidence for this period and 1.8 times the 1941-45 median. The number of cases was higher than in 1945 in all sections except the New England, Middle Atlantic and South Atlantic sections, and higher than the 1941-45 median in all sections except the Middle Atlantic and South Atlantic sections. More than 75 percent of the total cases were reported from 12 States, viz, Illinois 676, Minnesota 508, California 506, Wisconsin 384, New York 380, Missouri 322, Kansas 264, Michigan 257, Ohio 197, Colorado 183, Nebraska 156, Washington 140, Iowa 128, and Massachusetts 110.

A comparison of geographic areas shows that in the South Atlantic section where the current epidemic started, the number of cases has dropped below the 1941-45 median and in the Middle Atlantic section where only about the normal seasonal increase occurred, the number of cases was also below the median expectancy. While the cases have fluctuated considerably from week to week, it is apparent that the peak of the present epidemic has been reached in all sections of the country, with the possible exception of New England where the highest incidence was reported during the week ended October 5. Since the beginning of the year there have been 19,656 cases of poliomyelitis reported, as compared with 13,527, 19,882, and 12,856 for the same number of weeks in 1945, 1944, and 1943, respectively.

*Number of reported cases of nine communicable diseases in the United States during the 4-week period September 8–October 5, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941–45.*

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	1,232	1,959	1,732	3,592	3,906	3,503	2,403	2,450	2,484
New England.....	80	30	25	4	50	16	521	229	286
Middle Atlantic.....	129	77	74	30	19	10	575	325	460
East North Central.....	156	170	143	86	112	112	350	455	455
West North Central.....	71	99	110	44	18	29	55	69	104
South Atlantic.....	260	643	643	721	1,085	1,013	220	80	124
East South Central.....	195	419	273	110	100	100	79	55	54
West South Central.....	152	328	294	2,332	2,310	1,828	160	146	127
Mountain.....	44	67	67	248	160	208	169	336	270
Pacific.....	145	126	91	17	43	77	274	755	558
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States.....	240	350	350	5,488	3,198	3,032	3,447	5,035	5,035
New England.....	22	11	20	231	202	199	299	306	336
Middle Atlantic.....	50	78	78	487	905	733	613	772	772
East North Central.....	54	72	72	1,616	655	655	867	1,087	1,169
West North Central.....	16	41	41	1,530	344	313	278	447	482
South Atlantic.....	36	46	46	166	258	258	474	919	919
East South Central.....	20	28	28	117	112	112	243	370	385
West South Central.....	18	36	24	288	216	55	140	389	181
Mountain.....	10	3	5	367	172	60	115	179	179
Pacific.....	23	44	44	686	275	167	418	596	550
	Smallpox			Typhoid and paratyphoid fever			Whooping cough <sup>2</sup>		
United States.....	16	11	17	411	646	647	7,364	8,184	10,045
New England.....	0	0	0	29	23	34	818	933	933
Middle Atlantic.....	0	0	0	66	71	108	1,847	2,525	2,525
East North Central.....	7	1	7	61	75	85	2,587	1,720	2,898
West North Central.....	1	3	3	33	26	45	249	262	451
South Atlantic.....	1	1	1	48	113	133	667	989	1,108
East South Central.....	1	2	2	32	161	107	181	303	303
West South Central.....	1	3	3	70	109	110	685	568	563
Mountain.....	5	0	0	41	41	46	211	290	478
Pacific.....	0	1	0	25	27	33	394	610	834

<sup>1</sup> Mississippi and New York excluded; New York City included.

<sup>2</sup> Mississippi excluded.

*Influenza.*—For the country as a whole the incidence of influenza during the 4 weeks ended October 5 was about normal, 3,592 cases being reported as compared with 3,906 during the corresponding period in 1945, and a 5-year median of 3,503 cases. More than 60 percent of the total cases occurred in the State of Texas (2,229 cases). Minor increases were reported from the Middle Atlantic, West North Central and East South Central sections, but in other regions the incidence was lower than the seasonal expectancy.

#### DISEASES BELOW MEDIAN PREVALENCE

*Diphtheria.*—The number of cases of diphtheria rose from 843 during the 4 weeks ended September 7 to 1,232 during the 4 weeks ended October 5. An increase of this disease is normally expected at this

season of the year, but the current rate of increase was somewhat less than in preceding years. For the third consecutive 4-week period the current incidence has been below that for the corresponding period in 1945, with the last two periods showing fewer cases than in any corresponding period in the 18 years for which these data are available. From October 1944 until July 1946, inclusive, the number of cases for each 4-week period was higher than for the corresponding period in the preceding year, as well as higher than the preceding 5-year median for each period. Prior to the latter part of 1944 there had been a consistent decline in the incidence of this disease and recent reports seem to represent the beginning of another downward movement.

An examination of diphtheria cases by geographic sections shows that the decrease was due largely to a sharp decline in the numbers of cases in the South Atlantic and South Central sections where the disease has been unusually prevalent. However, in all other regions except the West North Central and Mountain sections, the number of cases reported during the current 4 weeks was higher than the preceding 5-year median.

*Measles*.—The incidence of measles was about normal, the number of cases reported (2,403) being slightly below the 1945 incidence for the corresponding 4 weeks, and lower than the 1941-45 median. Excesses over the seasonal expectancy were reported from the Atlantic Coast and South Central sections, but in all other regions the incidence was relatively low.

*Meningococcus meningitis*.—For the 4 weeks ended October 5 there were 249 cases of meningococcus meningitis reported, as compared with 359 in 1945, which figure also represents the 1941-45 median for this period. The incidence was about normal in the New England section, above the preceding 5-year median in the Mountain section, and lower than the normal seasonal expectancy in all other sections. For the country as a whole the current incidence was the lowest since 1942 when 192 cases were reported for these same weeks.

*Scarlet fever*.—The incidence of scarlet fever was also relatively low. The number of cases reported for the country as a whole was 3,447, or about 70 percent of the incidence for the corresponding period in 1945; the 1941-45 median expectancy was 5,035 cases, represented by the 1941 incidence. The number of cases in each geographic section was less than the 1941-45 median. For the country as a whole the current incidence was the lowest in the 18 years for which these data are available.

*Smallpox*.—For the current 4-week period there were 16 cases of smallpox reported as compared with 11 for the corresponding period in 1945 and a preceding 5-year median of 17 cases. Seven of the total



cases occurred in the East North Central section where the 1941-45 median was also seven, but the five cases in the Mountain sections compared with a median of zero cases.

*Typhoid and paratyphoid fever.*—The number of cases (411) of these diseases was about 60 percent of the normal expectancy (647 cases). The incidence was lower than the 1941-45 median in each section of the country. The current incidence of these diseases was also the lowest in the 18 years for which these data are available.

*Whooping cough.*—For the 4 weeks ended October 5 there were 7,364 cases of whooping cough reported. In the corresponding 4 weeks of 1945 there were 8,184 cases and the 1941-45 median was approximately 10,000 cases. The incidence was below the 1945 level as well as below the 1941-45 median in all sections of the country except the West South Central.

#### MORTALITY, ALL CAUSES

For the 4 weeks ended October 5 there were 33,532 deaths from all causes reported to the Bureau of the Census by 93 large cities. The average for the corresponding weeks of the three preceding years was 32,849 deaths. In the current period the number of deaths was higher than the average in the first and fourth weeks, and lower than the average in the second and third weeks. The total number of deaths was 2.1 percent more than the average for the corresponding 4 weeks in the three preceding years.

### DEATHS DURING WEEK ENDED OCTOBER 5, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 5, 1946	Correspond- ing week, 1945
Data for 92 large cities of the United States:		
Total deaths.....	8,393	8,255
Average for 3 prior years.....	8,241	.....
Total deaths, first 40 weeks of year.....	353,237	353,882
Deaths under 1 year of age.....	776	593
Average for 3 prior years.....	611	.....
Deaths under 1 year of age, first 40 weeks of year.....	25,564	24,004
Data from industrial insurance companies:		
Policies in force.....	67,282,507	67,797,900
Number of death claims.....	11,117	11,825
Death claims per 1,000 policies in force, annual rate.....	8.6	8.9
Death claims per 1,000 policies, first 40 weeks of year, annual rate.....	9.6	10.2

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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REPORTS FROM STATES FOR WEEK ENDED OCTOBER 12, 1946

### Summary

The decline in the incidence of poliomyelitis for the country as a whole continued through the eighth consecutive week. Decreases occurred in all sections of the country except the New England area, where increases were reported in Vermont and Connecticut. A total of 1,042 cases was reported, as compared with 1,142 last week, 711 for the corresponding week in 1944, and a 5-year (1941-45) median of 484. More than half of the current cases and of the total to date occurred in the North Central States. Of 31 States reporting currently 5 or more cases, 16 showed an increase (311 to 393), while a decline (756 to 604) occurred in the other 15 of these States. Reports from the 22 States reporting currently 12 or more cases each are as follows (last week's figures in parentheses): *Increases*—Connecticut 17 (6), New Jersey 13 (10), Pennsylvania 12 (10), Michigan 57 (54), Iowa 39 (24), Missouri 70 (65), North Dakota 14 (10), Kansas 71 (66), Mississippi 12 (4), Oklahoma 17 (10), Washington 36 (29); *decreases*—Massachusetts 32 (33), New York 77 (86), Ohio 14 (44), Indiana 23 (24), Illinois 139 (142), Wisconsin 67 (74), Minnesota 67 (97), Nebraska 44 (51), Texas 21 (24), Colorado 21 (28), California 65 (100).

The total of 341 cases of diphtheria for the current week is lower than reported for the corresponding week of any prior year, the lowest number previously recorded being 415, reported for the week in 1943. The cumulative total, 12,128, however, is above that for any corresponding period since 1939.

Of the total of 124 cases of undulant fever (as compared with 78 for the corresponding week last year), 52 occurred in Iowa, where 39 cases were reported last week in 29 counties.

Deaths recorded for the week in 93 large cities of the United States totaled 8,585, as compared with 8,503 last week, 8,380 and 8,390, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,488. The cumulative figure is 371,107, as compared with 366,622 for the same period last year.

*Telegraphic morbidity reports from State health officers for the week ended Oct. 12, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Oct. 12, 1946	Oct. 13, 1945		Oct. 12, 1946	Oct. 13, 1945		Oct. 12, 1946	Oct. 13, 1945		Oct. 12, 1946	Oct. 13, 1945	
NEW ENGLAND												
Maine.....	4	1	0	-----	1	-----	30	4	4	1	0	1
New Hampshire.....	0	0	0	-----	-----	-----	38	-----	1	0	0	0
Vermont.....	1	3	0	-----	-----	-----	64	-----	1	0	0	0
Massachusetts.....	20	0	3	-----	-----	-----	80	67	67	2	2	3
Rhode Island.....	0	0	0	-----	20	-----	-----	2	4	1	0	2
Connecticut.....	0	0	1	4	-----	6	11	5	6	1	1	1
MIDDLE ATLANTIC												
New York.....	21	5	11	12	(1)	13	67	16	66	7	8	8
New Jersey.....	2	4	2	3	4	5	18	14	19	1	4	4
Pennsylvania.....	15	6	8	1	1	1	147	100	67	7	5	8
EAST NORTH CENTRAL												
Ohio.....	16	10	11	2	-----	2	42	11	19	3	5	5
Indiana.....	16	13	9	5	2	5	7	3	5	0	3	1
Illinois.....	7	7	14	1	1	7	14	50	19	4	4	7
Michigan <sup>1</sup> .....	5	12	12	3	1	1	12	60	57	3	2	2
Wisconsin.....	0	2	2	11	21	19	31	15	43	2	2	2
WEST NORTH CENTRAL												
Minnesota.....	8	5	5	-----	-----	-----	2	0	0	0	1	0
Iowa.....	4	3	2	-----	3	-----	1	2	8	5	0	0
Missouri.....	4	5	5	1	2	1	4	3	5	2	3	3
North Dakota.....	0	0	1	1	3	4	4	-----	-----	0	0	0
South Dakota.....	2	2	4	-----	-----	-----	-----	2	2	0	0	0
Nebraska.....	2	7	7	8	-----	2	3	4	4	0	1	0
Kansas.....	4	5	2	4	2	2	3	13	0	2	0	0
SOUTH ATLANTIC												
Delaware.....	0	1	1	-----	-----	-----	-----	1	1	0	0	0
Maryland <sup>2</sup> .....	2	26	7	-----	-----	3	3	1	4	2	2	2
District of Columbia.....	0	0	0	1	-----	-----	9	-----	1	0	0	1
Virginia.....	21	30	30	165	119	123	1	20	20	1	2	2
West Virginia.....	5	30	11	6	-----	1	5	-----	2	1	0	1
North Carolina.....	15	34	59	-----	-----	1	29	3	7	2	2	2
South Carolina.....	1	30	30	52	302	218	-----	40	6	0	0	1
Georgia.....	12	33	33	7	18	13	3	3	5	0	1	1
Florida.....	11	7	7	2	8	8	2	-----	1	3	0	1
EAST SOUTH CENTRAL												
Kentucky.....	24	28	16	-----	-----	-----	4	23	7	0	1	2
Tennessee.....	20	20	23	18	38	11	8	1	6	2	3	3
Alabama.....	10	23	32	4	18	18	-----	1	3	3	2	1
Mississippi <sup>1</sup> .....	17	44	17	-----	-----	-----	-----	-----	-----	1	1	1
WEST SOUTH CENTRAL												
Arkansas.....	3	12	12	17	28	17	1	4	5	0	2	1
Louisiana.....	8	8	10	1	4	3	1	1	1	0	1	1
Oklahoma.....	1	5	10	13	9	23	2	1	1	0	2	0
Texas.....	24	60	46	1,077	712	647	31	25	25	8	2	2
MOUNTAIN												
Montana.....	0	1	2	-----	-----	2	1	15	11	3	1	0
Idaho.....	1	0	0	9	7	3	1	57	1	0	0	0
Wyoming.....	0	2	1	-----	1	2	-----	1	4	1	0	0
Colorado.....	5	9	8	11	33	25	11	5	12	0	0	0
New Mexico.....	2	4	4	-----	3	1	9	2	-----	0	0	0
Arizona.....	2	1	1	30	20	47	3	1	13	0	0	0
Utah <sup>2</sup> .....	0	0	0	11	-----	-----	4	8	8	0	0	0
Nevada.....	0	0	0	-----	-----	-----	-----	1	1	0	0	0
PACIFIC												
Washington.....	11	12	3	-----	-----	-----	7	80	9	0	4	2
Oregon.....	5	9	2	2	-----	7	7	-----	11	0	2	2
California.....	10	17	24	1	7	28	59	157	101	6	6	6
Total.....	841	592	517	1,473	1,398	1,200	779	837	980	74	75	75
41 weeks.....	12,128	11,355	10,537	198,638	78,593	88,361	643,810	106,311	546,291	4,689	6,845	6,845

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Oct. 12, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>2</sup>		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	Oct. 12, 1946	Oct. 13, 1945		Oct. 12, 1946	Oct. 13, 1945		Oct. 12, 1946	Oct. 13, 1945		Oct. 12, 1946	Oct. 13, 1945	
NEW ENGLAND												
Maine.....	3	5	4	15	19	14	0	0	0	1	2	2
New Hampshire.....	4	1	1	0	7	2	0	0	0	0	0	0
Vermont.....	6	1	1	4	2	4	0	0	0	0	1	0
Massachusetts.....	32	28	19	33	60	92	0	0	0	1	3	3
Rhode Island.....	0	0	1	1	4	4	0	0	0	0	0	0
Connecticut.....	17	9	7	6	5	18	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York.....	77	68	68	91	108	120	0	0	0	2	13	12
New Jersey.....	13	32	25	52	14	35	0	0	0	3	3	3
Pennsylvania.....	12	27	27	55	117	112	0	0	0	1	7	7
EAST NORTH CENTRAL												
Ohio.....	14	20	20	92	111	120	0	0	0	3	5	5
Indiana.....	23	3	3	54	40	49	0	0	0	3	2	3
Illinois.....	130	48	36	52	104	104	0	0	0	1	4	4
Michigan.....	57	16	22	70	71	74	0	0	0	1	5	4
Wisconsin.....	67	49	12	34	61	68	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	67	16	16	21	30	43	1	0	0	0	0	0
Iowa.....	39	34	14	16	44	44	0	0	0	1	0	1
Missouri.....	70	0	4	23	31	31	0	0	0	4	2	3
North Dakota.....	14	1	1	0	3	0	0	0	0	1	0	0
South Dakota.....	6	0	1	3	4	13	0	0	0	0	0	0
Nebraska.....	44	7	6	14	11	24	0	0	0	0	0	0
Kansas.....	71	5	6	10	36	57	0	0	0	1	0	1
SOUTH ATLANTIC												
Delaware.....	4	0	2	9	3	4	0	0	0	0	2	1
Maryland.....	2	1	2	9	14	25	0	0	0	1	2	2
District of Columbia.....	1	6	3	9	9	11	0	0	0	0	0	0
Virginia.....	4	6	6	63	79	42	0	0	0	0	10	10
West Virginia.....	4	2	2	75	114	51	0	0	0	0	2	3
North Carolina.....	43	5	5	18	82	82	0	0	0	2	0	4
South Carolina.....	0	6	2	3	8	12	0	0	0	1	2	2
Georgia.....	1	0	1	12	19	23	0	0	0	2	2	3
Florida.....	11	5	3	5	7	7	0	0	0	1	5	1
EAST SOUTH CENTRAL												
Kentucky.....	1	2	4	24	62	62	0	0	0	3	7	5
Tennessee.....	4	19	7	34	36	51	0	0	0	0	3	4
Alabama.....	1	1	1	15	13	21	0	0	0	0	2	2
Mississippi.....	12	6	1	23	10	12	0	0	0	2	1	2
WEST SOUTH CENTRAL												
Arkansas.....	10	5	3	5	20	13	1	0	0	1	9	6
Louisiana.....	0	0	1	1	10	10	0	0	0	4	2	4
Oklahoma.....	17	12	2	2	20	17	0	0	0	2	2	4
Texas.....	21	20	12	28	57	33	0	0	0	12	10	9
MOUNTAIN												
Montana.....	5	7	0	4	18	10	0	0	0	0	2	0
Idaho.....	4	3	0	2	5	12	0	0	0	0	1	0
Wyoming.....	2	7	1	0	8	8	0	0	0	0	0	0
Colorado.....	21	2	2	5	20	20	0	0	0	1	1	1
New Mexico.....	5	0	0	1	8	7	0	0	0	0	0	1
Arizona.....	4	3	0	5	13	8	0	0	0	2	1	1
Utah.....	3	7	2	10	13	10	0	0	0	1	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	36	14	8	26	25	25	0	0	0	0	0	1
Oregon.....	8	4	5	12	19	19	0	0	0	2	2	1
California.....	65	30	14	94	138	114	0	0	0	7	5	5
Total.....	1,042	549	484	1,132	1,730	1,736	2	0	5	87	121	122
41 weeks.....	420,681	10,845	10,819	93,085	143,991	108,609	297	286	644	3,384	4,003	4,618

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 1; New Jersey 1; Ohio 1; Illinois 1; Missouri 1; Georgia 1; Colorado 1; Arizona 1; Utah 1; California 1.

<sup>3</sup> Corrected report: North Carolina, polio-myelitis, week ended September 21, 2 cases (instead of 3).

Telegraphic morbidity reports from State health officers for the week ended Oct. 12, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Oct. 12, 1946								
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infecti- ous	Rocky Mt spot- ted fever	Tul- aremia	Ty- phus fever, en- demo	Un- du- lant fever	
	Oct 12, 1946	Oct 13, 1945		Ame- bic	Bacil- lary	Un- speci- fied						
NEW ENGLAND												
Maine.....	1	12	12		-							
New Hampshire.....		2	2									
Vermont.....	5	11	12									2
Massachusetts.....	95	104	99		2							
Rhode Island.....	29	6	19									
Connecticut.....	26	22	22									3
MIDDLE ATLANTIC												
New York.....	142	209	209	3	5			1		2	3	
New Jersey.....	91	101	92									
Pennsylvania.....	110	132	171	1			1			1	1	
EAST NORTH CENTRAL												
Ohio.....	32	97	139									3
Indiana.....	19	17	13		2		2	1	1		1	
Illinois.....	81	60	170	1	1		1				11	
Michigan.....	222	101	167	1	1							1
Wisconsin.....	11*	62	137	1								
WEST NORTH CENTRAL												
Minnesota.....	12	19	41									52
Iowa.....	11	3	11									1
Missouri.....	1	13	13					1	2			1
North Dakota.....	1		11				1					1
South Dakota.....			6									1
Nebraska.....	5		7									1
Kansas.....		26	26				1					1
SOUTH ATLANTIC												
Delaware.....	1	1	1									
Maryland.....	18	26	49			3		2				
District of Columbia.....	9	7	7									
Virginia.....	24	10	29			28			1		1	
West Virginia.....		25	11									
North Carolina.....	12	58	69					2		1		
South Carolina.....	4	74	37									
Georgia.....	7	31	17		2				1	9	2	
Florida.....	20	1	5							3		
EAST SOUTH CENTRAL												
Kentucky.....	10	32	32		1							1
Tennessee.....	21	11	31	1			1		3		2	
Alabama.....	7	7	7									
Mississippi.....									1			
WEST SOUTH CENTRAL												
Arkansas.....	5	1	9	2			(5)		1	3		
Louisiana.....		2	1	1				1		16		
Oklahoma.....	1	2	3	7							1	
Texas.....	171	86	96	7	103	15			1	20	7	
MOUNTAIN												
Montana.....	3	6	17									1
Idaho.....	1	1										
Wyoming.....		1	4									
Colorado.....	14	21	21	1								
New Mexico.....	10		5				2					
Arizona.....	8	7	7				26					
Utah.....	3	9	16						1			
Nevada.....												
PACIFIC												
Washington.....	9	10	17									
Oregon.....	5	4	12									1
California.....	61	126	126	3		9		1		3	9	
Total.....	1,436	1,566	2,357	29	219	77	8	8	15	85	124	
Same week, 1945.....	1,596			58	438	262	10	2	11	164	78	
Average, 1943-45.....	1,785			50	435	199	11	2	11	137		
41 weeks: 1945.....	78,899			2,275	12,988	5,358	515	543	749	2,824	4,072	
1945.....	100,809			1,525	20,994	9,250	521	445	617	3,955	3,780	
Average, 1943-45.....	109,904		144,350	1,554	17,564	7,666	544	440	584	8,349		

\* Period ended earlier than Saturday

† Delayed report: Arkansas, week ended August 17, 1 case, included in cumulative total only

‡ 5-year median, 1941-45.

§ Anthrax: California, 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Oct. 5, 1946

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Etiophallitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyellitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases.	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	-----	0	2	1	7	0	0	1
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	1	0	0	0	0	0	0	-----
Massachusetts:												
Boston.....	16	0	-----	1	6	0	11	22	12	0	0	25
Fall River.....	0	0	-----	0	-----	0	0	0	1	0	0	2
Springfield.....	0	0	-----	0	15	0	1	0	2	0	0	7
Worcester.....	0	0	-----	0	-----	0	7	5	1	0	0	-----
Rhode Island:												
Providence.....	1	0	-----	0	-----	0	3	0	1	0	0	8
Connecticut:												
Bridgeport.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Hartford.....	0	0	-----	0	-----	0	0	2	4	0	0	4
New Haven.....	0	0	-----	0	1	0	2	0	1	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo.....	1	0	-----	0	-----	0	2	0	4	0	0	6
New York.....	8	1	3	0	12	5	31	40	23	0	3	30
Rochester.....	0	0	-----	0	5	0	0	3	4	0	0	1
Syracuse.....	0	0	-----	0	-----	0	0	1	3	0	0	9
New Jersey:												
Camden.....	0	0	-----	0	-----	0	1	0	1	0	0	1
Newark.....	0	0	1	0	-----	0	6	4	4	0	0	15
Trenton.....	0	0	1	1	-----	0	4	0	1	0	0	2
Pennsylvania:												
Philadelphia.....	2	0	1	1	4	0	12	1	11	0	0	28
Pittsburgh.....	3	0	-----	0	24	0	18	0	7	0	0	4
Reading.....	0	0	-----	0	2	0	4	0	0	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0	-----	0	1	1	3	3	9	0	0	4
Cleveland.....	2	0	2	0	14	1	2	18	7	0	0	9
Columbus.....	1	0	1	1	-----	0	1	0	5	0	0	4
Indiana:												
Fort Wayne.....	0	0	-----	0	1	0	1	0	0	0	1	-----
Indianapolis.....	0	0	-----	0	-----	1	3	5	2	0	2	6
South Bend.....	0	0	-----	0	4	0	0	1	0	0	0	-----
Terre Haute.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Illinois:												
Chicago.....	1	1	-----	1	5	2	23	37	16	0	1	44
Michigan:												
Detroit.....	1	0	-----	0	3	0	6	14	18	0	0	57
Flint.....	0	0	-----	0	-----	0	1	0	2	0	0	1
Grand Rapids.....	0	0	-----	0	-----	0	0	1	4	0	0	9
Wisconsin:												
Kenosha.....	0	0	-----	0	-----	0	0	4	0	0	0	-----
Milwaukee.....	0	0	-----	0	4	0	1	11	3	0	0	43
Racine.....	0	0	-----	0	-----	0	0	2	3	0	0	4
Superior.....	1	0	-----	0	-----	0	0	0	0	0	0	-----
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	-----	0	-----	0	0	3	0	0	0	-----
Minneapolis.....	0	0	-----	0	1	0	3	6	2	0	0	-----
St. Paul.....	0	0	-----	0	-----	0	2	6	2	0	0	10
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	5	15	4	0	0	6
St. Joseph.....	0	0	-----	0	-----	0	0	1	0	0	0	4
St. Louis.....	2	0	-----	1	-----	2	7	13	2	0	1	5

## City reports for week ended Oct. 5, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	1	0		0		0	0	4	3	0	0	
Nebraska:												
Omaha.....	1	0		0	1	0	0	17	0	0	1	3
Kansas:												
Topeka.....	0	0		0		0	0	1	3	0	0	4
Wichita.....	0	0		0		0	3	2	1	0	0	
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0		0		0	0	1	2	0	1	
Maryland:												
Baltimore.....	5	0	4	3		1	5	2	4	0	0	16
Cumberland.....	0	0		0		0	0	0	0	0	0	1
Frederick.....	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington.....	0	0		0	5	0	1	3	0	0	0	10
Virginia:												
Lynchburg.....	0	0		0	2	0	0	0	0	0	0	1
Richmond.....	1	0		0		0	2	0	1	0	0	4
Roanoke.....	5	0		0		0	0	0	3	0	0	
West Virginia:												
Charleston.....	2	0		0		0	0	0	1	0	0	
Wheeling.....	0	0		0		0	1	1	0	0	0	
North Carolina:												
Raleigh.....	0	0		0	1	0	0	0	0	0	0	5
Wilmington.....	0	0		0		0	1	0	0	0	0	
Winston-Salem.....	0	0		0	2	0	0	0	1	0	0	2
South Carolina:												
Charleston.....	0	0	4	0	1	0	4	0	0	0	0	
Georgia:												
Atlanta.....	0	0	1	0		0	5	0	2	0	0	
Savannah.....	0	0		0	3	0	0	0	0	0	0	
Florida:												
Tampa.....	0	0		0	1	0	2	0	2	0	0	
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0		0		0	6	2	4	0	0	5
Nashville.....	0	0		1		0	6	0	0	0	0	1
Alabama:												
Birmingham.....	0	0		0		0	4	1	3	0	0	
Mobile.....	1	0		0		0	1	2	0	0	0	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0		0	1	0	0	0	0	0	0	
Louisiana:												
New Orleans.....	1	0	1	0	3	0	3	3	2	0	0	
Shreveport.....	1	0		0		0	0	2	0	0	1	
Texas:												
Dallas.....	1	0		0		0	2	0	3	0	0	
Galveston.....	3	0		0		0	0	0	0	0	0	1
Houston.....	0	0		0		0	4	0	0	0	0	
San Antonio.....	1	0		0		0	2	0	1	0	0	
MOUNTAIN												
Montana:												
Billings.....	0	0		0		0	0	0	0	0	0	
Great Falls.....	0	0		0	3	0	0	0	0	0	0	
Helena.....	0	0		0		0	0	1	0	0	0	
Missoula.....	0	0		0		0	0	0	1	0	0	
Idaho:												
Boise.....	0	0		0		0	1	0	0	0	0	
Colorado:												
Denver.....	3	0	4	0	3	0	0	6	2	0	0	14
Utah:												
Salt Lake City.....	0	0		0	5	0	1	0	1	0	0	

## City reports for week ended Oct. 5, 1946—Continued

	Diphtheria cases	Etiophalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	2	0	0	0	1	0	1	4	3	0	0	2
Spokane	0	0	0	0	0	0	1	4	0	0	0	1
Tacoma	0	0	0	0	1	0	0	0	0	0	0	2
California:												
Los Angeles	3	0	0	0	8	0	3	30	21	0	0	5
Sacramento	0	0	0	0	0	0	1	0	0	0	0	0
San Francisco	0	0	1	0	1	0	5	3	8	0	0	1
Total	70	2	24	10	142	13	227	316	240	0	11	436
Corresponding week, 1945	70		48	8	200		254		327	0	22	564
Average, 1941-45	73		44	11	193		265		402	0	25	796

1 3-year average, 1943-45.

2 5-year median, 1941-45.

*Dysentery, amebic*.—Cases: New York 3; Philadelphia 1; Los Angeles 1.*Dysentery, bacillary*.—Cases: New York 5; Richmond 1.*Dysentery, unspecified*.—Cases: San Antonio 5; Great Falls 1.*Leprosy*.—Cases: Tampa 1.*Rocky Mountain spotted fever*.—Cases: New York 1; Richmond 1.*Typhus fever, endemic*.—Cases: Boston 1; New York 3; Raleigh 1; Charleston, S. C., 1; Savannah 1; Little Rock 1; New Orleans 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 34,238,800)

	Diphtheria case rates	Etiophalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	44.4	0.0	0.0	2.6	60	0.0	68.0	78.4	76	0.0	0.0	128
Middle Atlantic	6.5	0.5	2.8	0.9	22	2.3	33.8	22.7	27	0.0	1.4	45
East North Central	4.3	0.6	1.8	1.2	18	3.1	28.2	58.9	44	0.0	2.5	114
West North Central	8.0	0.0	0.0	2.0	4	4.0	39.8	151.2	34	0.0	4.0	64
South Atlantic	18.1	0.0	14.8	4.9	25	1.6	34.6	11.5	26	0.0	1.6	64
East South Central	11.8	0.0	0.0	5.9	0	0.0	100.3	29.5	41	0.0	0.0	35
West South Central	20.1	0.0	2.9	0.0	11	0.0	31.6	14.3	17	0.0	2.9	3
Mountain	26.0	0.0	34.7	0.0	95	0.0	17.3	60.7	35	0.0	0.0	121
Pacific	7.9	0.0	1.6	0.0	17	0.0	17.4	64.8	51	0.0	0.0	17
Total	10.7	0.3	3.7	1.5	22	2.0	34.7	48.3	37	0.0	1.7	67

## PLAGUE INFECTION IN KERN COUNTY, CALIF.

Under date of October 7, 1946, plague infection was reported proved, on September 30, in a pool of 5 ticks from 24 ground squirrels, *C. beecheyi*, shot 1 mile south and 2 miles east of El Tejon School, Kern County, Calif., and received at the laboratory on September 11.

## TERRITORIES AND POSSESSIONS

## Hawaii Territory

*Plague (rodent)*.—Under date of October 9, 1946, plague infection has been reported in a mass of spleen and liver from a pool of 36 rats trapped on September 10, 1946, in District 3A, Kapulena, Hamakua District, Island of Hawaii, T. H.



## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended September 21, 1946.*—During the week ended September 21, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brun- swick	Que- bec	On- tario	Mani- toba	Sas- katch- ewan	All t	British Colum- bia	Total
Chickenpox.....		3		17	73	10	7		27	156
Diphtheria.....		1	2	27	11	1	2			45
Dysentery, bacillary.....				2						2
Encephalitis, infectious.....										1
German measles.....		1		2	6					25
Influenza.....		2			1	1				4
Measles.....		8	2	40	21	8	33			109
Meningitis, meningococ- cus.....				3	2	2				7
Mumps.....				9	87	24	46	23		233
Poliomyelitis.....	7	2	6	121	26	4	5			173
Scarlet fever.....		8	0	43	48	7				129
Tuberculosis (all forms).....		22	15	158	34	14	21			318
Typhoid and paratyphoid fever.....		1		20	2	1	2			
Undulant fever.....					2					
Venereal diseases:										
Gonorrhea.....	8	18	13	118	132	44	40			491
Syphilis.....		8	6	90	72	7	8			242
Other forms.....										3
Whooping cough.....		8		55	45	12	5			140

### IRISH FREE STATE

*Vital statistics—Second quarter ended June 30, 1946.*—The following table shows the numbers of marriages, births, and deaths in the Irish Free State for the second quarter ended June 30, 1946. The figures are provisional:

Number of marriages.....	4,115	Deaths from—Continued	
Number of births.....	18,045	Diphtheria.....	30
Births per 1,000 population.....	24.1	Influenza.....	219
Number of deaths (all ages).....	10,534	Measles.....	9
Deaths per 1,000 population.....	14.1	Puerperal infection.....	2
Deaths under 1 year of age.....	1,020	Tuberculosis (all forms).....	1,000
Deaths under 1 year of age per 1,000 births.....	57	Typhoid fever.....	3
Deaths from:		Whooping cough.....	31
Cancer.....	936		
Diarrhea and enteritis (under 2 years of age).....	184	NOTE.—Estimated population, July 1, 1946, 2,992,000.	

## JAMAICA

*Notifiable diseases—4 weeks ended September 21, 1946.*—During the 4 weeks ended September 21, 1946, certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis.....		1	Scarlet fever.....		1
Chickenpox.....	2	11	Tuberculosis (respiratory).....	32	68
Diphtheria.....	6	6	Typhoid fever.....	6	90
Dysentery, unspecified.....		4	Typhus fever (murine).....	3	1

## NORWAY

*Notifiable diseases—May 1946.*—During the month of May 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	16	Measles.....	570
Diphtheria.....	350	Mumps.....	188
Dysentery, unspecified.....	33	Paratyphoid fever.....	6
Epidemic encephalitis.....	4	Pneumonia (all forms).....	2,012
Erysipelas.....	436	Poliomyelitis.....	30
Gastroenteritis.....	3,804	Rheumatic fever.....	233
Gonorrhea.....	1,288	Scabies.....	3,902
Hepatitis, epidemic.....	486	Scarlet fever.....	530
Impetigo contagiosa.....	2,872	Syphilis.....	174
Influenza.....	3,494	Tuberculosis (all forms).....	545
Lymphogranuloma inguinale.....	2	Whooping cough.....	3,559

# REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

## Cholera

*China.*—Cholera has been reported in certain provinces of China as follows: Chekiang Province—July 1–31, 1946, 739 cases, 66 deaths in Huchow; August 11–20, 1946, 122 cases, 29 deaths including 42 cases in Ningpo; September 1–10, 1946, 141 cases, 21 deaths in Ningpo; Honan Province—August 11–20, 1946, 277 cases, 16 deaths; Hopeh Province—August 11–20, 1946, 56 cases, 27 deaths, September 11–20, 1946, 13 cases in Tientsin; Hunan Province—August 21–31, 1946, 135 cases, 49 deaths; Kiangsu Province—July 21–31, 1946, 712 cases, 122 deaths including 202 cases with 13 deaths in Chinkiang, 204 cases with 12 deaths in Nantung, and 93 cases with 65 deaths in Kuyang.

**Plague**

*China—Chekiang Province—Wenchow.*—For the period August 11–20, 1946, 48 cases of plague were reported in Wenchow, Chekiang Province, China.

*Peru.*—For the month of August 1946, 3 cases of plague were reported in Cayalti Farm, Chiclayo Province, Lambayeque Department, and 1 case of plague was reported in Pampa de Gallina, Tumbes Province, Tumbes Department, Peru.

**Smallpox**

*Colombia.*—For the month of September 1946, 68 cases of smallpox with 1 death were reported in Colombia. Departments reporting the highest incidence are: Santander, 23 cases; Cundinamarca, 11 cases; Bolivar, 8 cases; Cauca, 6 cases; North Santander, 6 cases; National Territories, 7 cases.

*Mexico.*—For the month of August 1946, 38 cases of smallpox were reported in Mexico. States reporting the highest incidence are: Guerrero, 20 cases; Michoacan, 10 cases; Jalisco, 7 cases; Guanajuato, 1 case.

**Typhus Fever**

*Colombia.*—For the month of September 1946, 69 cases of typhus fever with 5 deaths were reported in Colombia. Departments reporting the highest incidence are: Caldas, 26 cases, 1 death; Narino, 14 cases, 2 deaths; Antioquia, 13 cases, 1 death; Cundinamarca, 7 cases, 1 death; Santander, 6 cases.

*Mexico.*—For the month of August 1946, 209 cases of typhus fever were reported in Mexico. States reporting the highest incidence are: Federal District, 45 cases including Mexico, D. F., 35 cases; Mexico, 34 cases; Nuevo Leon, 24 cases; Hidalgo, 20 cases; Coahuila, 16 cases; Puebla, 11 cases.

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

**G. ST. J. PERROTT, *Chief of Division***

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

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Skin-Sensitizing Properties of DDT for the Guinea Pig  
Sickness Absenteeism Among Industrial Workers, 1945  
Malaria Infection Through Blood Transfusion



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# Public Health Reports

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## RICKETTSIALPOX—A NEWLY RECOGNIZED RICKETTSIAL DISEASE <sup>1</sup>

### I. ISOLATION OF THE ETIOLOGICAL AGENT

By ROBERT J. HUEBNER, *Senior Assistant Surgeon*, PEGGY STAMPS, *Bacteriologist*,  
and CHARLES ARMSTRONG, *Medical Director*, United States Public Health Service

During July 1946, a peculiar febrile disease characterized by an initial lesion and an eruption of a vesiculo-papular type was reported to the National Institute of Health. The outbreak occurred in a housing development in New York City and cooperative studies were undertaken—members of the city health department <sup>2</sup> and the authors participating in various phases of the work. An investigation of 80 cases during the succeeding 10 weeks disclosed a strikingly uniform clinical entity.

Because of a clinical resemblance to chickenpox and because the organism isolated from one patient has the morphological and cultural characteristics of rickettsiae, the name "rickettsialpox" is proposed. Sussman (3) recently reported three cases resembling those observed by us. Clinical and epidemiological features of the disease will be presented in later papers (1, 2).

In the course of these etiological studies, 15 blood specimens, 1 bone-marrow specimen, 1 skin-lesion washing, and 1 lymph-node washing were inoculated into animals. An organism possessing the morphological, cultural, and staining characteristics of a rickettsia was recovered from the tissues of a single mouse, which had been inoculated with blood drawn on the second day of fever from one of the patients (M. K.).

It is the purpose of this paper to describe the isolation of the M. K. organism, and to record observations on the illness produced by it in

<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health.

<sup>2</sup>Dr. Morris Greenberg, Dr. Ottavio Pallitteri.



certain laboratory animals. Antigens prepared from yolk-sac cultures of the M. K. organism and serums from 19 ill or convalescent patients were studied in the complement-fixation test. The results of this study are also presented.

#### ISOLATION OF THE M. K. ORGANISM

Whole blood drawn from the patient M. K. on July 26, 1946, 2 days after onset of fever was immediately placed in a dry ice container. Approximately 2 hours later the specimen was thawed rapidly and inoculated intraperitoneally into five mice and two guinea pigs. Nine days later (August 4, 1946) two of the five mice appeared ill. Inactivity, rapid breathing, and ruffled fur characterized the general appearance of both mice. Central nervous system symptoms were absent. The three other mice, which were observed for 30 days, at no time presented signs of illness. One of the sick mice became moribund and was sacrificed. The second sick mouse died during the night and was unfit for further study. Autopsy of the first mouse revealed a small amount of blood-tinged peritoneal fluid, large lymph nodes, an enlarged edematous liver, and a dark engorged spleen which was enlarged 8 to 10 times. The respiratory and intestinal tract appeared normal. The liver and spleen, the brain, and the pooled lymph nodes were suspended in saline and inoculated intraperitoneally into three groups of white mice (Swiss strain). In addition, the liver and spleen suspension was inoculated intraperitoneally into two guinea pigs.

The three suspensions used for inoculation produced objective signs of illness in each group of inoculated mice and in the two guinea pigs—the latter responding with 3 and 4 days of fever and marked scrotal reactions. The signs of disease in the mice were immobility, rapid breathing, and ruffled fur. Two of the mice in the liver and spleen passage died on the seventh day after inoculation. A second liver and spleen passage was made on the ninth day, and autopsy of the donor mouse revealed the same gross pathology as the original mouse. The liver and spleen line of passage at the time of writing is in its fourth subpassage in mice. It still produces objective illness but deaths are rare.

In the brain passage deaths did not occur, although ruffled fur and immobility were observed on the ninth day. On the twelfth day after inoculation the brain was removed from one of the mice which still appeared quite ill; a suspension was made in saline and this was inoculated into the yolk sacs of fertile eggs that had been incubated 7 days. The suspension produced no growth on blood agar. Seven days later all the embryos were moribund or dead. Films made from the yolk sacs revealed large numbers of minute intracellular and

extracellular diplobacilli staining well by Machiavello's method but poorly with methylene blue. Embryonic fluid of all the eggs produced no growth when placed on plain and blood agar.

The mice inoculated with lymph-node-passage material developed ruffled fur but no other apparent signs of illness. On the ninth day one of the mice was sacrificed, and typical post mortem findings were observed. Since there was considerable blood-tinged peritoneal fluid, this was aspirated, placed on blood agar, and inoculated into the yolk sacs of fertile eggs.

Seven days later there was no growth on the blood agar slant but all the chick embryos were dead or moribund. Again the yolk sacs showed a profuse growth of bipolar rods resembling rickettsiae. Subcultures on blood agar again were negative.

A third yolk-sac isolation of what proved to be the same organism was made from the blood of one of the two guinea pigs inoculated with the liver and spleen suspension from the original mouse. The organism was not apparent in the yolk sacs until 13 days after inoculation, suggesting a relative paucity of M. K. organisms in guinea pig blood. These three isolations from the original mouse appear to be identical. Reinoculation of yolk-sac suspensions of the M. K. organism into mice and guinea pigs results in a disease similar to that produced by animal passage material. All attempts to cultivate the M. K. organism on acellular media have failed; in addition to ordinary media, special media such as tryptose agar, Casman's blood agar, chocolate blood agar, and glucose cystine agar were employed in aerobic, anaerobic, and 20-percent carbon dioxide atmospheres.

#### THE M. K. ORGANISM AS A COMPLEMENT-FIXING ANTIGEN

A 10-percent suspension of first-passage yolk sacs containing many visible M. K. organisms was prepared and titrated as an antigen in the complement-fixation test<sup>3</sup> against convalescent serums of two patients, H. B. and J. M. Serum pools collected from guinea pigs which had recovered from endemic typhus, Rocky Mountain spotted fever, and Q fever were also employed. A portion of the 10-percent suspension was extracted with ether and the aqueous layer tested as an antigen against the same serums. The results (shown in table 1) reveal a complement-fixing reaction between the M. K. antigens and three of the serums—the Rocky Mountain spotted fever, the H. B., and the J. M. serums.

The M. K. antigen achieved its highest titer with the Rocky Mountain spotted fever serum. This is in contrast to the lower titers given against the same serums by R161, an ether-treated Rocky Mountain

<sup>3</sup> The Bengtson technique was used throughout.

spotted fever antigen. It should be noted that other treatment increased the titer of the M. K. antigen in the presence of the serums of both patients.

TABLE 1.—*Titrations of crude and ether-extracted M. K. antigens against five serums in the complement-fixation test*

Antigens	Serums used in fixed dilution	Serum dilution	Results with various antigen dilutions						Results with antigen control dilutions	
			Un-diluted	1:2	1:4	1:8	1:16	1:32	1:1	1:2
M. K. No. 1—10-percent crude antigen.	Endemic typhus	1:16	0	0	0	0	0	0	0	0
	Rocky Mt. spotted fever.	1:16	4	4	4	1	4	4		
	Q fever	1:16	0	0	0	0	0	0		
	H. B. <sup>1</sup>	1:10	4	4	1	1	0	0		
	J. M. <sup>2</sup>	1:10	4	1	3	2	1	0		
M. K. No. 2—10-percent ether-extracted antigen.	Endemic typhus	1:16	0	0	0	0	0	0	0	0
	Rocky Mt. spotted fever.	1:16	4	4	4	1	4	1		
	Q fever	1:16	0	0	0	0	0	0		
	H. B.	1:10	4	4	1	3	1	1		
	J. M.	1:10	1	1	4	4	1	(2)		
R161—30-percent ether-extracted Rocky-Mt.-spotted-fever antigen.	Endemic typhus	1:16	0	0	0	0	0	0	0	0
	Rocky Mt. spotted fever.	1:16	1	1	4	4	3	2		
	Q fever	1:16	0	0	0	0	0	0		
	H. B.	1:10	1	4	1	3	1	(2)		
	J. M.	1:10	4	4	4	4	1	0		
NYS—10-percent crude normal yolk-sac antigen.	Endemic typhus	1:16	0	0	0	0	0	0	0	0
	Rocky Mt. spotted fever.	1:16	0	0	0	0	0	0		
	Q fever	1:16	0	0	0	0	0	0		
	H. B.	1:10	0	0	0	0	0	0		
	J. M.	1:10	0	0	0	0	0	0		

<sup>1</sup> Serums of rickettsial pox patients taken 30 days after onset.

<sup>2</sup> Transient.

More potent M. K. antigens were subsequently prepared, ether extraction by method No. 1 and method No. 2 of Topping and Shepard (4) being the methods of choice. As with antigens prepared from *Rickettsia prowazeki*, *Rickettsia mooseri*, and *Rickettsia rickettsi*, a soluble antigen which could not be precipitated by high-speed centrifugation (4,000 r. p. m.) for 1 hour was found to be present in the M. K. antigens. Except for cross reaction with Rocky Mountain spotted fever, the antigens possessed a high degree of specificity in the complement-fixation test (table 2). Generally, the titer of human Rocky Mountain spotted fever serums has been lower when tested with the M. K. antigens than with homologous antigens.

#### SEROLOGICAL REACTIONS OF SERUMS FROM TYPICAL CASES, INCLUDING SERUMS FROM M. K.

Serums from patients with typical symptomatology were tested against M. K. antigens and a Rocky Mountain spotted fever antigen in the complement-fixation test. M. K. No. 2 and M. K. No. 3 as

well as R161, a Rocky Mountain spotted fever antigen, were used. Proteus OX19, and OX2 and OXK agglutinations were also done.

TABLE 2.—*Specificity of M. K. antigens in the complement-fixation test, showing the results given by the various types of serums tested to date against the M. K. antigens*

Type of serums tested	Total number of serums	Number of serums negative	Number of serums positive	Titer or range of titers of positive serums
<b>HUMAN SERUMS</b>				
Normal.....	18	17	1	1:4 (3+)
Endemic typhus.....	6	6	0	—
Tsutsugamushi.....	3	3	0	—
Q fever.....	6	4	2	1:4 each
Syphilis.....	4	4	0	—
Rocky Mountain spotted fever.....	11	1	10	1:8 to 1:512
Do.....	19	0	19	1:32 to 1:640
<b>GUINEA PIG SERUMS</b>				
Normal.....	7	7	0	—
Endemic typhus.....	1	1	0	—
Q fever pool.....	1	1	0	—
Rocky Mountain spotted fever.....	7	0	7	1:16 to 1:512
Do.....	23	0	23	1:8 to 1:512

TABLE 3.—*Complement-fixation results on serums of patients tested with M. K.<sup>1</sup> and Rocky Mountain spotted fever<sup>2</sup> antigens*

Patient	Date of onset	Date of specimens	M. K. titer	Rocky Mountain spotted fever titer
<b>1946</b>				
J. R.....	Mar. 7..	July 24..	1:32.....	Negative.
Mrs. C.....	Mar. 15..	July 24..	1:16.....	1:4.
Mr. C.....	Mar. 20..	July 24..	1:256.....	Negative.
B. B.....	June 9..	July 11..	Not done.....	1:128 (AC <sup>3</sup> 1:16).
		Aug. 20..	1:256.....	1:128.
M. B.....	June 23..	July 11..	1:32.....	Negative.
		Aug. 21..	1:16.....	Negative.
C. F.....	July 11..	July 12..	Not done.....	Negative.
		Sept. 13..	1:64.....	1:16.
Mr. S.....	July 7..	July 26..	1:32.....	Negative.
		Aug. 8..	1:64.....	1:4.
M. S.....	July 14..	July 24..	Negative.....	Negative.
		Aug. 18..	1:256.....	1:64.
C. B.....	July 17..	Aug. 20..	1:64.....	1:8.
L. A.....	July 18..	July 24..	1:8.....	Negative.
		Aug. 18..	1:128.....	1:128.
J. M.....	July 18..	Aug. 18..	1:640.....	1:320.
A. G.....	July 20..	Aug. 4..	1:320.....	1:80.
Mrs. S.....	July 25..	Aug. 18..	1:64.....	1:64.
H. B.....	July 27..	Aug. 18..	1:320.....	1:80.
M. K.....	July 22..	Aug. 29..	1:512.....	1:256.
W. N.....	July 23..	Sept. 11..	1:64.....	1:8.
M. M.....	Aug. 10..	Aug. 29..	1:64.....	Negative.
A. A.....	Aug. 18..	Aug. 29..	1:128.....	1:8.
		Sept. 11..	1:128.....	1:32.
D. G.....	Aug. 31..	Sept. 7..	1:4.....	Negative.
		Sept. 11..	1:32.....	1:16.

<sup>1</sup> M. K. No. 2 and No. 3.

<sup>2</sup> R 161.

<sup>3</sup> Anticomplementary.

In table 3, it will first of all be noted that the serum of each patient tested reacted in the convalescent stage with the M. K. antigen, one of the highest titers being afforded by the convalescent serum of M. K. Significant but lower reactions occurred in the presence of the Rocky Mountain spotted fever antigen in 15 cases, which repre-

sent 79 percent of the total. Most significant, however, is the rise in titer against M. K. antigen shown by the serums of 4 cases, M. S., Mr. S., L. A., and D. G. Convalescent serum from a guinea pig which had shown a typical response to the M. K. mouse-liver and mouse-spleen passage was strongly positive when tested with the M. K. antigen but was completely negative in the presence of R161. Many of the convalescent serums have been tested with typhus and Q-fever yolk-sac antigens. In every instance they have been negative.

Proteus reactions were without significance in every case except two: J. M. who had a convalescent titer of 1:200 against *Proteus* OX19, and J. R. with a titer of 1:100 also against *Proteus* OX19. Since only one serum specimen was available for examination in both instances a rise in agglutinin titer was not demonstrated.

Negative results were obtained in agglutination tests for tularemia, brucellosis, leptospirosis, and the typhoid group. Heterophile agglutinations were also negative. Repeated blood cultures taken during acute stages of the disease were in every instance sterile.

#### BEHAVIOR OF THE M. K. ORGANISM IN THE YOLK SACS OF FERTILE EGGS AND IN CERTAIN LABORATORY ANIMALS

The M. K. organism at the time of writing has been carried through four yolk-sac passages. Yolk-sac seed materials diluted 1:10 to 1:10,000 produce death of the embryos 4 to 7 days after inoculation. Yolk-sac films stained by Machiavello's technique show red-staining diplobacillary and diplococcal forms which resemble *R. prowazeki* and *R. mooseri* in morphology. Many M. K. organisms appear on smear to be located within the nuclei of yolk-sac cells.

The staining characteristics of the M. K. organism in yolk-sac films are quite similar to those of *R. prowazeki*. Machiavello's method provides the best results, Geimsa's stain is adequate, but methylene blue and Gram's method give poor results. Apparently the organisms are decolorized by the acetone of the Gram method but take the counterstain only with indifferent success.

#### BEHAVIOR IN MICE

In white mice (Swiss strain) the M. K. organism has been carried through four passages of both brain and spleen suspensions. Intra-peritoneal inoculation results in definite objective signs of illness, but few deaths occur. Ruffled fur is noticed as early as the sixth day after inoculation. Immobility and rapid breathing associated with no apparent interest in food and water mark the peak of the disease which is reached between the ninth and thirteenth days. Deaths may occur any time during this period. Intracerebral inoculation of infected

brain produces signs of illness earlier and results in a larger percentage of deaths than with intraperitoneal inoculation.

One cubic centimeter of heart blood taken from a sick mouse failed in one attempt to cause visible signs of illness when inoculated into the peritoneum of three fresh mice. The brain from this same mouse produced typical signs of illness when inoculated intraperitoneally into four fresh mice.

Heavily infected yolk sacs diluted 1:10 in 50-percent skim milk produced death in mice within 5 to 7 days after intraperitoneal inoculation. Less potent suspensions resulted in typical signs of illness, but death was not uniformly produced. Intravenous inoculation into mice of a potent suspension has thus far provided no evidence of a toxic substance. However, in one experiment a yolk-sac dilution as high as 1:320 was lethal within 7 days for the four mice inoculated. In lower dilutions, death occurred as early as the fourth day, and signs of illness appeared within 3 days.

Tissues of M. K. mice placed repeatedly on ordinary culture media have failed to lead to the cultivation of an organism of any significance. Occasional colonies of staphylococci and salmonella were obtained but these are occasionally encountered in work with mice at the National Institute of Health.

#### BEHAVIOR IN GUINEA PIGS

The M. K. organism has been maintained without difficulty through four passages in guinea pigs by means of intraperitoneal inoculation of tunica washings. Redness and swelling of the scrotum and irreducible testes, often the first signs of the disease, occur usually on the fifth day after inoculation. The onset of fever may occur anywhere from the fourth to the sixth day. A short febrile course (3 to 5 days) is marked by remissions. It is not uncommon for a guinea pig to show marked redness and swelling of the scrotum and a temperature of 40.5° C. on the fifth morning after inoculation, a normal temperature on the sixth morning, and a temperature of 40.0° C. on the seventh morning.

Temperatures taken twice daily, in the morning and in the afternoon, give a more accurate picture of the thermal reaction to the disease, often revealing a fever later in the day after a normal morning temperature has been recorded.

#### EFFECT IN GUINEA PIGS OF VARIOUS INOCULA

When tunica washings are used as passage material, redness and swelling of the scrotum are a constant pathological finding although

the temperature curve may often show only a single insignificant elevation.

We have been unable to reproduce signs of disease with any degree of regularity in guinea pigs when heart blood is used as passage material. On the few occasions when intraperitoneal inoculation of guinea-pig blood produced any reaction, the very mild objective signs of the disease were delayed until 10 to 15 days after inoculation.

Ten-percent yolk-sac suspensions inoculated intraperitoneally produce a more acute and severe febrile reaction. An abbreviated incubation period (1 or 2 days) is followed by a sudden onset of high fever ( $41^{\circ}$  C. and higher) which is sustained without remissions for 4 or 5 days. The onset of the scrotal reaction is usually delayed until the fourth day.

Gross pathology in the infected guinea pig is characterized by: (a) periorchitis with adherence of the testes to the tunica vaginalis which is thickened and markedly injected; (b) moderately enlarged spleen and lymph nodes; (c) occasional small areas of pneumonic consolidation; and (d) frequent indurated cutaneous and subcutaneous nodules at the site of inoculation.

No systematic attempt has been made as yet to examine animal tissues for visible organisms. However, a few small red-staining diplobacilli have been seen in films made of the peritoneum and tunica vaginalis stained by Machiavello's method.

#### DISCUSSION

Despite the fact that only one isolation of an organism (a rickettsia) has thus far been made, the evidence presented in the foregoing account we believe to be sufficient to establish it as the causative agent of the disease under study.

Classification of the M. K. organism as a rickettsia, we believe is justified. The arthropod vector will be described in a subsequent communication.

The characteristics of the M. K. organism on yolk-sac cultivation and its behavior in guinea pigs coupled with a serologic relationship to Rocky Mountain spotted fever are suggestive of *Rickettsia conori*, the causative agent of fièvre boutonneuse.

Certain differences between the reported behavior of *R. conori* in the laboratory and the M. K. organism have, however, been observed. We have been unable to produce any signs of illness in monkeys even with large doses of potent yolk-sac suspensions (6). The ability to produce objective illness in white mice apparently is not shared by *R. conori*, although this point seems not to have been extensively pursued by the Mediterranean investigators.

The failure of the disease under study to stimulate agglutinins for *Proteus* OX19 and OX2 in the serums of most of the New York patients would seem to differentiate it in this respect from fièvre boutonneuse which is reported to produce such agglutinins regularly (5).

Preliminary tests (6) suggest a partial but incomplete cross protection of guinea pigs convalescent from infection with the M. K. organism against challenge with the Bitter Root strain of *R. rickettsi*. Complete reciprocal cross immunity has been reported (7) as characterizing the immunological relationship of fièvre boutonneuse and Rocky Mountain spotted fever.

#### SUMMARY

An organism having the morphologic and cultural characteristics of a rickettsia has been isolated from a patient during the course of an unusual outbreak of disease occurring in New York. This organism produces illness in mice and guinea pigs and grows well in the yolk sacs of fertile eggs.

Ether-extracted yolk-sac antigens have been prepared which fix complement with convalescent serums drawn from typical cases. This reaction is apparently specific insofar as it has been tested, except for cross reactions with Rocky Mountain spotted fever.

The behavior of the M. K. organism in fertile eggs, mice, and guinea pigs has been described. Certain similarities to *R. conori* have been pointed out, but further work will be necessary before any conclusion as to further similarities is possible.

#### ACKNOWLEDGMENTS

The aid given by Commissioner Israel Weinstein, Dr. Samuel Frant, Dr. Morris Greenberg, and Dr. Ottavio Pellitteri, of the New York City Health Department, facilitated this work immeasurably.

Dr. Ralph Muckenfuss, director, and Miss Annabel W. Walter, bacteriologist, of the New York City Bureau of Laboratories, helped with the early laboratory work in addition to providing laboratory animals, space, and equipment.

We wish also to acknowledge the cooperation offered by the physicians in charge of the patients included in this study. We are particularly grateful for the help of Dr. Benjamin Shankman and Dr. Harry N. Zeller of Kew Gardens, Dr. Leon N. Sussman of Manhattan, and Dr. Irving S. Klein, assistant medical superintendent of the Willard Parker Hospital, New York.

NOTE: Since this paper was submitted for publication, a second strain of rickettsialpox has been isolated from the blood of a patient,



M. S. The M. S. strain is culturally and immunologically indistinguishable from the M. K. strain.

More recently, a report of cases by Dr. Benjamin Shankman has appeared in the New York State Journal of Medicine (8).

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### SKIN-SENSITIZING PROPERTIES OF DDT FOR THE GUINEA PIG<sup>1</sup>

By JOHN E. DUNN, *Surgeon*, ROBERT C. DUNN, *Surgeon*, and BARBARA S. SMITH, *Physiologist*, *United States Public Health Service*

#### INTRODUCTION

The excellent insecticidal properties of 2,2 bis(p-chlorophenyl)-1,1,1-trichloroethane (DDT) has led to its widespread military use; with an increasing commercial supply, it will be extensively used as an agricultural and household insecticide. A great deal of laboratory work has been and is being done to determine the toxicity of this compound for various animal species; a considerable practical experience is accumulating regarding its potential danger to man. A less vital, but nevertheless important consideration involves the determination of the potential cutaneous sensitizing properties of the compound since methods of use provide ample opportunity for exposure. This report is concerned with an attempt to produce cutaneous sensitization in the guinea pig.

Despite the extensive use of DDT by the military and the intimate cutaneous exposure of large numbers of individuals in war areas, there have been no reports of proved dermatitis from this material.

<sup>1</sup> From the Industrial Hygiene Research Laboratory, National Institute of Health.

One report states, however, that cutaneous sensitization was induced in guinea pigs by multiple intracutaneous injections of an aqueous suspension of DDT (1). Several attempts to accomplish sensitization by various methods were made in this laboratory.

#### EXPERIMENTAL PROCEDURE

Three methods commonly used for studying cutaneous sensitization of guinea pigs to simple chemical compounds were used in an attempt to produce cutaneous sensitization to DDT. The methods involved: (1) percutaneous application (a) of a solution of DDT in lubricating oil and (b) of an acetone solution of DDT on 0.5 cm.<sup>2</sup> skin area according to the method developed in this laboratory (2); (2) intracutaneous injection of DDT in corn oil; and (3) the intracutaneous injection of (a) an aqueous suspension of DDT with and without a surface active agent; (b) a suspension prepared by adding 0.5 cc. of a 2.5-percent solution of DDT in absolute alcohol to 99.5 cc. of physiologic saline.

Stock albino guinea pigs weighing 300 to 800 gm. were used; in a few cases, larger animals were used. Since age and sex seem to be a less important factor than individual variability in skin sensitization of guinea pigs (3), no attempt was made to use a group homogeneous in these respects.

The DDT used for the sensitization studies was obtained from a supply available in this laboratory which had been recrystallized from 95-percent ethanol. For percutaneous application (group 1a), a 10-percent solution was prepared in an SAE 30 machine oil; for intracutaneous injection (group 2), a 25-percent solution in corn oil was used. Since DDT crystallized out of solution at room temperature, it was necessary to warm the oil preparations in a water bath before use. Care was taken to maintain the solutions at a temperature which would not damage tissue. A 2.5-percent solution of DDT in acetone was used for the percutaneous tests (group 1b) with DDT alone on 0.5 cm.<sup>2</sup> skin areas. The aqueous suspension (group 3a) was prepared by grinding DDT in a mortar, adding water to make a paste, and then gradually taking the material to volume to give a 0.1-percent suspension. To maintain the suspension, a surface active agent was added.<sup>2</sup> As a control, animals injected with an aqueous suspension of DDT without detergent indicated that the detergent added little, if any, to the resulting reaction. It was later found that the reactions from the injections were due to using water rather than physiologic saline as the suspending medium and not to the DDT.

The treatment procedure involved daily percutaneous application or intracutaneous injection 6 days a week, except for group (3a) which

<sup>2</sup> One cubic centimeter of a 10-percent solution of a laboratory detergent (Aerosol, Fisher Scientific Co.) was added to 100 cc. of suspension.

was injected every second day. The various groups were treated as follows:

*Group 1a.*—A group of five animals was given daily percutaneous applications of 0.05 cc. of the solution of DDT in machine oil on one flank for 14 days; a like number of control animals was treated with machine oil alone. Nine days after the last treatment each group was tested for evidence of sensitization on the opposite flank in the same manner as before.

*Group 1b.*—A group of 5 animals was given 18 applications of 0.005 cc. of a 2.5-percent solution of DDT in acetone on 0.5 cm.<sup>2</sup> skin areas, each at a different site on the abdomen. Ten days after the last application a test for sensitivity was applied in the same manner.

*Group 2.*—A group of five animals was given daily intracutaneous injections of 0.1 cc. of the DDT solution in corn oil at different sites on the abdomen for 10 days; a like number of control animals was injected with corn oil alone. Thirteen days after the last sensitization injection the two groups were injected as before to determine evidence of sensitization.

*Group 3a.*—A group of 10 animals, which had previously been used for poison-ivy sensitization, the majority of which had been found to sensitize easily with that material, were given injections of 0.1 cc. of the aqueous suspension of DDT with detergent every other day for 9 doses. Two other animals were injected daily 6 days a week with the same material for 14 injections; a third animal was given daily injections of DDT suspension plus detergent and of DDT suspension without detergent for 24 injections of each. Twelve days after the last injection, all animals were given a single test injection to determine sensitivity. In addition 5 control animals each received a single injection of the DDT-detergent suspension.

*Group 3b.*—A group of 10 animals was given a series of 18 intracutaneous injections of 0.1 cc. of the DDT suspension in physiologic saline each at a different site on one flank. Twelve days after the last of these injections, a similar injection was given in the opposite flank as a test for sensitivity.

#### RESULTS

The results from the different methods of treatment were as follows:

*Group 1a.*—There was no evidence of sensitization in the group of animals treated by percutaneous application of DDT in machine oil. Some of the animals of both the DDT-treated and control groups showed a very slight, indefinite erythema of the painted areas after several applications. After the tenth treatment the DDT-treated and control animals were mixed and then separated into two groups according to whether or not there was erythema of the treated area.

Three of the treated and two of the control animals were in the first group with erythema, and three control and two treated animals in the group without erythema. None of the DDT-treated or control animals showed any effect from the application of the sensitization test on the opposite flank at the end of the experiment.

*Group 1b.*—There were no reactions from any of the percutaneous tests using the acetone solution of DDT. The test for sensitivity was made with a 20-percent acetone solution; this concentration left a grossly visible coating of DDT on the test area. No reactions resulted.

*Group 2.*—The animals injected with the solution of DDT in corn oil and the control animals injected with plain oil all showed considerable local reaction at the site of the intracutaneous injections. This was characterized by tumefaction, more or less erythema, and often a central blanched area which frequently became necrotic and after several days sloughed away, leaving a small conical ulcer that slowly healed. The sensitization tests at the end of the experiment produced erythematous nodules in the DDT-treated animals which varied in diameter from 12 to 13 mm. at 24 hours after injection; similar lesions were produced in the controls from the oil alone varying from 10 to 12 mm. in diameter.

As a further test for sensitivity both the DDT-treated and control groups were painted on the clipped flank with 0.05 cc. of the DDT solution in machine oil and of plain machine oil, respectively. No reaction appeared in any of the animals from this treatment.

As a matter of interest and to demonstrate the presence of DDT at the sites of the intracutaneous injections and to determine possible systemic effects, the DDT-treated and control animals were killed, and the abdominal skin over the injection area and all organs were examined histologically.

At autopsy the skin showed the only significant findings. At the site of injections there were usually small papular or pustular lesions; these were seen more frequently in the DDT-treated animals and appeared in various stages of healing. A vertical section through these lesions revealed yellowish to greenish, small to medium-sized discolorations in and subjacent to the dermal lesions, diffusely in the thickened subcutaneous tissue, and focally among the muscle bundles below. Skin blocks were cut vertically through the lesions, including the adjacent tissue, laterally and below. Routine tissue blocks were taken from the liver, kidney, lungs, heart, adrenal, spleen, pancreas, and voluntary muscle. These blocks were fixed in neutral, buffered formalin. Frozen sections of liver, kidney, lung, and often skin and heart were cut and stained for lipoids by the technique of Lillie and Ashburn (4), substituting oil red O.

One block of each of these tissues was embedded in paraffin, and sections were stained routinely by azure eosinate, the Prussian blue reaction, and the hemoglobin-collagen stain (5).

In the skin of both groups, numerous oil droplets about  $5\mu$  to  $10\mu$  in diameter were found mainly in the slightly to markedly thickened and densely cellular

fibrous tissue and granulation tissue of the hypodermis and the reticular layer of the derma. In addition, smaller extensions of a similar process were occasionally noted in the papillary layer of the derma and between the muscle bundles below the hypodermis. The oil droplets were very numerous and were usually found in the many scattered and grouped macrophages, and multinucleated, often huge, giant cells, which were mingled with a few lymphocytes, neutrophils, and eosinophils. A few to many oil-filled, round spaces,  $10\mu$  to  $25\mu$  in diameter, often margined by oil-laden macrophages and mononuclear cells, were found in the hypodermis, most numerous next to the subjacent muscle layer, and in lesser numbers in the upper half of the hypodermis, the reticular layer of the derma, and the papillary layer of the derma. These may be lymphatic vessels of the deep and superficial cutaneous plexuses. There were also many free oil globules scattered in the derma and a few very large globules of oil scattered in the hypodermis.

A few small-to-medium-sized abscesses were found at the dermal-hypodermal junction. The largest abscesses occasionally continued upward through the derma to communicate by a crateriform tract with a relatively small, raised, ulcerated, crusted lesion in the surface epithelium. In the pus of the abscesses were a few oil globules and fragments of hair shafts. These findings were more pronounced in the DDT-treated animals than in the controls.

As a matter of histopathologic interest it may be noted that there were a few small, scattered, slightly basophilic, lipid globules, and often on the inner wall of the lipid-containing spaces, translucent peripheral rims of insoluble lipid material which persisted in the paraffin sections. This material is evidently altered lipid and appears closely related to ceroid. It is sudanophilic, faintly acid fast, and in the fluorescence microscope the material has a strong silvery fluorescence.

In the test animals a few to numerous, elongated, prismatic, bi-refrinent crystals, morphologically similar to DDT crystals were noted focally in medium-sized and large globules of oil, usually in the hypodermis. A few isolated, similar crystals were seen near but not in giant cells and embedded in the abscesses.

The moderately acanthotic, vacuolated epithelium on the surface and lining the entrance to the hair follicles usually showed a slight thickening of the granular layer and slight hyperkeratosis. Hair follicles were usually sparse in the vicinity of abscesses and reaction areas.

The liver of one animal in each group showed moderate amounts of finely globular fat distributed unevenly in the hepatic cells. The spleens of three DDT-treated animals and one control showed moderate amounts of phagocytosed hemosiderin in the red pulp. There were no significant findings in the kidney, lungs, heart, adrenal, pancreas, and voluntary muscle.

In general both the DDT-treated and control guinea pigs showed the same fundamental pathologic process in the skin, manifested chiefly by the presence of fibroblastic reaction, foreign-body giant cells, macrophages, and large oil globules. This foreign-body reaction was more marked in the DDT-treated animals, presumably because of DDT crystals. There is, however, no reason to believe that this additional severity of reaction is more than may be accounted for by the physical presence of relatively insoluble crystals.

*Group 3a.*—The animals injected intracutaneously with the aqueous suspension of DDT containing detergent showed considerable local

reaction at each injection site similar to the effects from the oil injections but less severe. The size or intensity of the reactions did not alter appreciably during the course of the injections. From the sensitivity test, the treated animals showed reactions varying from 6 to 11 mm. in greatest diameter at 24 hours as compared with reactions of 9 to 11 mm. in greatest diameter for five control animals.

*Group 3b.*—There was no evidence of sensitivity in the animals injected with DDT suspended in physiologic saline. The reactions that occurred were no more than was to be expected from an intracutaneous injection and varied from evidence of the needle prick to a slight, indefinite erythema 2 to 4 mm. in diameter. The reactions from the first sensitization injections were the same as those from the test for sensitivity.

#### DISCUSSION

There was no evidence during these experiments to indicate that DDT is capable of inducing cutaneous hypersensitivity in the guinea pig. In a recent publication (7), a detailed analysis is presented identifying a long series of compounds found as contaminants in technical grade DDT. Some of these compounds are known to be capable of producing cutaneous hypersensitivity; the potentialities of others that were identified are not known. The work (1) published a few years ago wherein it was reported that skin hypersensitivity to DDT could be induced in guinea pigs made use of one of the first supplies of DDT available in this country. Consequently, it is possible that one or more of the contaminating compounds may have been responsible for the skin sensitivity induced rather than the DDT.

The intracutaneous injection of aqueous suspensions of water-insoluble compounds such as DDT, described elsewhere (1), was found to produce moderate reactions which are not seen when physiologic saline is used as the suspending medium. The reactions from water make it more difficult to evaluate reactions of cutaneous hypersensitivity using the intracutaneous-injection method.

#### SUMMARY

An attempt to induce cutaneous hypersensitivity to DDT in guinea pigs, using several methods, was unsuccessful.

A possible explanation is presented for the previously reported induction of cutaneous hypersensitivity to DDT in the guinea pig.

Histopathologic changes in the skin following injection of DDT in corn oil and of corn oil alone are described.

## ACKNOWLEDGMENT

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## SICKNESS ABSENTEEISM AMONG MALE AND FEMALE INDUSTRIAL WORKERS DURING 1945, WITH A NOTE ON THE RESPIRATORY EPIDEMIC OF 1945-46<sup>1</sup>

By W. M. GAFAFER, *Principal Statistician, United States Public Health Service*

Quarterly reports on sickness and nonindustrial injuries causing absence from work for more than 1 week among 200,000 male workers in 1945 have appeared (1-3), the basic data being yielded by records of sick benefit associations, group insurance plans, and company relief departments. The present paper deals with the experience of male and female workers in 1945 and earlier years. Reference is made to changes in the exposed population during the 10 years 1936-1945, to duration of absence in each of the 5 years 1941-45, and to the respiratory epidemic of 1945-46. The last report covering females appeared in 1945 (1).

### SICKNESS ABSENTEEISM, 1936-45

Male and female frequency rates for 1945, 1944, and the 10-year period 1936-45 are given by cause in table 1. Corresponding rates for the single years 1936-42 are found in reference 4, while rates for

<sup>1</sup> From the Industrial Hygiene Division, Bureau of State Services.

TABLE 1.—Average annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause, experience of MALE and FEMALE employees in various industries, 1945, 1944, and 1936 to 1945, inclusive <sup>1</sup>

Cause. (Numbers in parentheses are disease title numbers from International List of Causes of Death, 1039)	Annual number of absences per 1,000 persons					
	Males			Females		
	1945	1936-45 <sup>2</sup>	1944	1945	1936-45 <sup>2</sup>	1944
Sickness and nonindustrial injuries.....	147.4	109.2	140.9	257.9	174.4	221.0
Percent of female rate.....	57	63	64	175	160	187
Percent of male rate.....	13.2	11.8	12.1	16.4	13.4	14.5
Nonindustrial injuries (109-195).....	134.2	97.4	128.8	241.5	161.0	206.5
Sickness.....	55.8	43.5	57.6	110.3	72.4	85.5
Respiratory diseases.....	7	8	7	6	6	2
Tuberculosis of respiratory system (13).....	22.1	19.2	24.6	41.0	29.6	28.4
Influenza, grippe (33).....	9.6	6.5	9.7	11.8	8.7	11.2
Bronchitis, acute and chronic (106).....	5.3	4.4	6.3	2.9	2.1	2.2
Pneumonia, all forms (107-109).....	5.7	5.3	6.1	18.7	13.7	17.2
Diseases of pharynx and tonsils (115b, 115c).....	12.4	7.3	10.2	35.3	17.7	26.3
Other respiratory diseases (104, 105, 110-114).....	20.0	15.8	19.7	35.5	26.5	36.0
Digestive diseases.....	7.5	4.8	6.5	4.2	2.7	3.8
Diseases of stomach except cancer (117, 118).....	2.7	1.7	2.8	6.7	3.4	6.1
Diarrhea and enteritis (120).....	3.7	4.5	4.7	13.8	13.6	16.9
Appendicitis (121).....	2.9	1.8	2.1	6	4	8
Hernia (122a).....	4.1	3.0	3.6	10.2	6.4	8.4
Other digestive diseases (115a, 115d, 116, 122b-129).....	51.9	34.9	40.1	90.0	57.4	79.6
Nonrespiratory-nondigestive diseases.....	3.0	2.4	2.4	6.2	3.9	4.6
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44).....	7	5	5	4	4	2
Cancer, all sites (45-55).....	6.7	4.4	6.1	4.9	3.5	5.2
Rheumatism, acute and chronic (58, 59).....	2.8	1.4	2.4	14.3	8.1	14.0
Neurasthenia and the like (part of 84d).....	4.0	2.5	3.2	3.7	2.5	3.3
Neuralgia, neuritis, sciatica (87b).....	2.2	1.4	2.0	1.8	1.1	1.4
Other diseases of nervous system (80-85, 87, except part of 84d, and 87b).....	5.0	3.1	4.6	2.7	1.7	2.5
Diseases of heart (90-95).....	3.0	1.5	2.4	1.7	.9	1.4
Diseases of arteries and high blood pressure (96-99, 102).....	4.8	3.0	4.2	6.2	3.5	5.5
Other diseases of circulatory system (100, 101, 103).....	4	4	5	6	4	6
Nephritis, acute and chronic (130-132).....	3.6	2.7	3.6	18.8	11.6	15.2
Other diseases of genitourinary system (133-139).....	3.9	3.1	3.6	6.1	4.0	5.2
Diseases of skin (151-153).....	4.1	3.2	3.8	6.3	2.9	5.1
Diseases of organs of movement except diseases of joints (156b).....	7.7	5.3	6.8	16.3	12.9	15.5
All other diseases (56, 57, 60-79, 88, 89, 154, 155, 156a, 157, 162).....	5.6	3.2	5.4	5.7	4.7	5.4
Ill-defined and unknown causes (200).....	237, 287	2, 289, 475	267, 716	27, 065	201, 143	29, 750
Average number of person-years.....						

<sup>1</sup> Industrial injuries and venereal diseases are not included.

<sup>2</sup> Average of the 10 annual rates.

<sup>3</sup> Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

1943 appear in reference 5. The 10 annual rates for all causes, and each of the broad cause groups are shown graphically in figure 1.

*All causes.*—An examination of the total frequencies shown in figure 1 reveals that among both males and females the average annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 calendar days or longer has been increasing since 1938, culminating in male and female rates for 1945 which have not been equalled or exceeded during the 10-year period. Among males the most marked rise (30 percent) occurred from 1942 to 1943, all other annual increases being less than 10 percent. The male rate for 1945 (147.4 absences per 1,000 males) is 35



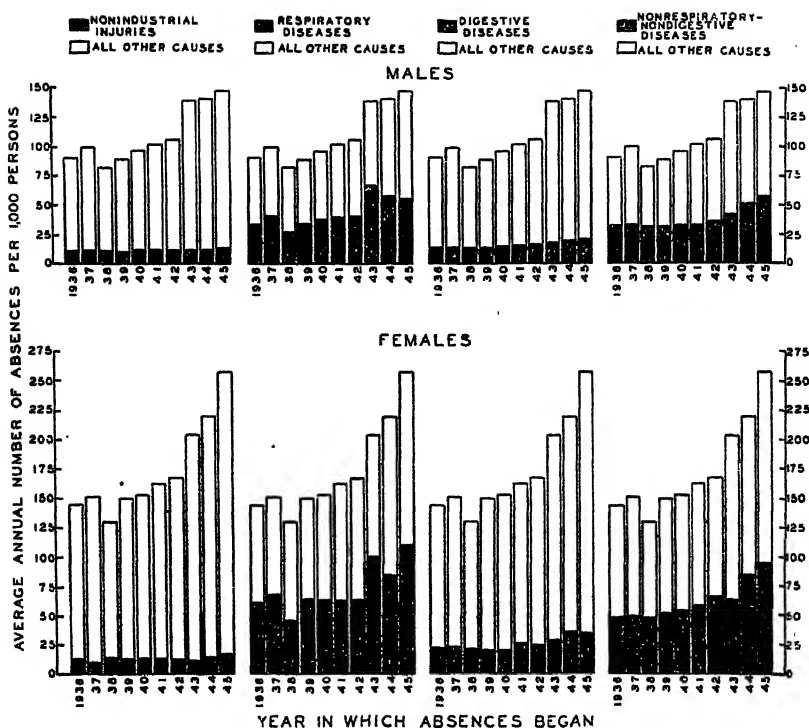


FIGURE 1.—Average annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by broad cause group and year in which absences began, experience of MALE and FEMALE employees in various industries, 1936 to 1945, inclusive. (Each bar for a particular year represents the average annual frequency from all causes and the contribution made to that frequency by a particular cause group. Nonrespiratory-nondigestive diseases include ill-defined and unknown causes.)

percent above the 10-year mean (109.2), but only 5 and 7 percent, respectively, above the rates for 1944 and 1943. Among females the 1945 rate (257.9 absences per 1,000 females) is 48 percent above the mean rate for the 10 years (174.4), and 17 percent above the corresponding rate for 1944.

In each of the 10 years the frequency of all disabilities among females is higher than the corresponding rate for males, the greatest excess (75 percent) occurring in 1945.

*Broad cause groups.*—Figure 1 shows also the variation over the 10 years in the rates for 4 broad cause groups. Particularly striking are the 1945 rates for the group of nonrespiratory-nondigestive diseases, yielding excesses of 51 and 54 percent over the corresponding 10-year means for males and females. Attention is directed also to decreases in 1944 and 1945 in the frequency of respiratory diseases among males. Nevertheless the 1945 respiratory rate (55.8 absences per 1,000 males) is exceeded only by the rates for 1944 and 1943,

and is 28 percent above the mean respiratory rate for the 10-year period.

*Specific nonrespiratory-nondigestive causes.*—Because of notable excesses in the 1945 male and female rates for the nonrespiratory-nondigestive group of diseases, it is appropriate to investigate time changes in the frequency of specific nonrespiratory-nondigestive causes. Figure 2 shows graphically the contribution over the 10 years

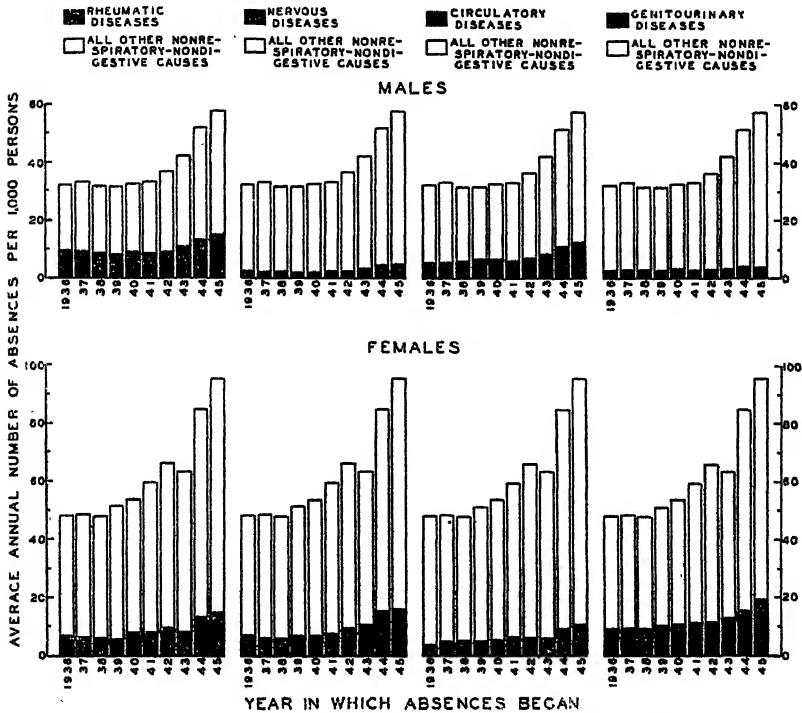


FIGURE 2.—Average annual number of absences per 1,000 persons on account of nonrespiratory-nondigestive diseases disabling for 8 consecutive calendar days or longer, by selected nonrespiratory-nondigestive cause and year in which absences began, experience of MALE and FEMALE employees in various industries, 1936 to 1945, inclusive. (Each bar for a particular year represents the average annual frequency from all nonrespiratory-nondigestive diseases, including ill-defined and unknown causes, and the contribution made to that frequency by a selected nonrespiratory-nondigestive cause.)

of the frequency of four specific nonrespiratory-nondigestive causes to the total frequency of all nonrespiratory-nondigestive diseases. These four causes, resulting each year in over half of all absences attributed to nonrespiratory-nondigestive diseases, are rheumatic diseases,<sup>2</sup> diseases of nervous system,<sup>3</sup> diseases of circulatory system, and diseases of genitourinary system.

<sup>2</sup> Rheumatism, acute and chronic; neuralgia, neuritis, and sciatica; and diseases of organs of movement except diseases of joints.

<sup>3</sup> Except neuralgia, neuritis, and sciatica.

In general, for both males and females the frequency of each nonrespiratory-nondigestive cause tends to increase over the 10 years. Among males the 1945 rates for rheumatic diseases, diseases of nervous system and diseases of circulatory system have not been equalled or exceeded throughout the 10-year period, the percentage excesses over the corresponding 10-year means being 47, 79, and 68, respectively. The 1945 rate for diseases of genitourinary system is exceeded only by the rate for 1944, and is 29 percent above the 10-year mean.

Among females the 1945 rate for each of the four specific causes is the highest recorded for the 10-year period, and is over 60 percent above the corresponding 10-year mean.

During the early years of the decade the frequency of rheumatic diseases was higher among males than among females, the sex difference tending to disappear in recent years. Throughout the 10 years the frequency of circulatory diseases remained higher among males. In each year the frequency of nervous diseases among females was about three times the corresponding rate for males, the female rate for genitourinary diseases being approximately four times the corresponding male rate.

#### POPULATION CHANGES, 1936-45

Observed increases in the frequency of 8-day or longer disabilities over the past decade, and particularly the persistence of relatively high rates in the years 1943-45, raise the question of associated changes in various factors possibly affecting rates. In this connection, an inquiry is made into the possible relation of changes in the magnitude of the working population under study during 1936-45, and the behavior of the experienced frequency rates.

For purposes of investigation 18 companies reporting continuously throughout the 10 years were classified by industry as follows:

	<i>Industry</i>	<i>Number of companies</i>
<i>Group A.</i> —Industries with marked population increases, 1936-45:		
	Chemical and allied products.....	1
	Electrical equipment.....	3
	Iron and steel.....	2
	Plumbing fixtures and allied products.....	1
<i>Group B.</i> —Industries with relatively slight population changes, 1936-45:		
	Public utilities.....	3
	Soap products.....	1
	All others (printing and publishing; transportation; paper, underwear, watch manufacturing).....	7

It will be noted that the industries of group A, selected on the basis of marked population increases, are more closely related to the war effort than the industries of group B showing relatively slight population changes over the 10 years.

Figure 3 presents graphically for Groups A and B the 10-year variation in the average annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 calendar days or longer, and the average number of employees by sex and industry. Data for female employees of the iron and steel industry were not generally reported, and hence not shown in the figure.

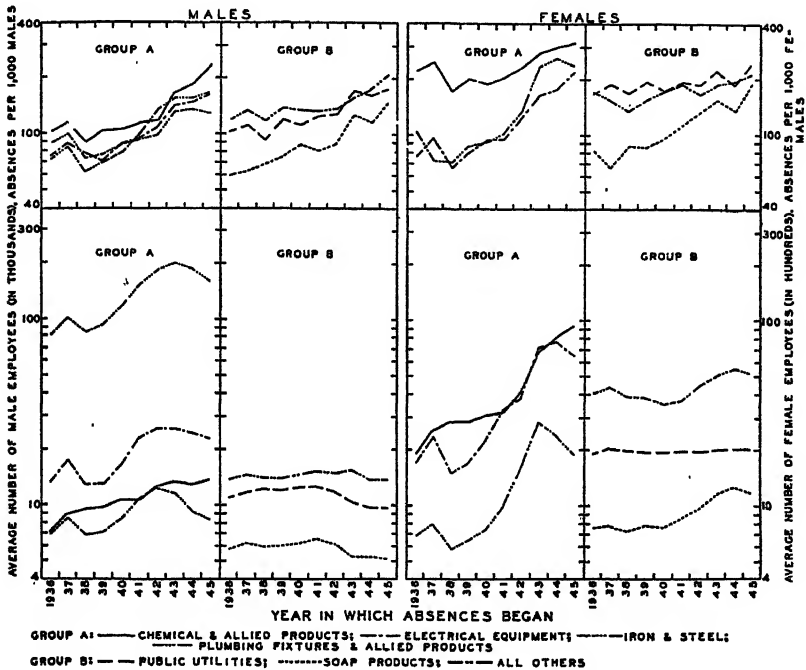


FIGURE 3.—Average annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, and average number of employees, by industrial group and year in which absences began, experience of MALE and FEMALE employees in various industries, 1936 to 1945, inclusive.

Figure 3 reveals a number of relationships which may be briefly summarized as follows:

(1) For each industry, regardless of group or sex, the frequency of sickness and nonindustrial injuries tends to increase over the 10-year period.

(2) In each of the four industries of group A the average number of male employees almost doubled from 1936 to 1942, only the chemical and allied products industry continuing to add to its male employees during the last 3 years. Decreases from the peak populations of 1942 and 1943 were recorded in 1944 and 1945 for male employees of the other three industries, but the frequency of disability in these industries remained relatively high. Indeed, with the exception of

the iron and steel industry, the average annual number of absences per 1,000 males in 1945 for the industries of group A had not been equalled or exceeded throughout the 10-year period.

(3) With regard to group B the average number of male employees in public utilities and the soap products industry decreased some 20 percent from 1941 to 1945, the frequency of disability in these industries increasing over 50 percent in the same period.

(4) While some increase in the average number of female employees occurred in the soap products industry and "all others" of group B, the additions appear relatively slight in comparison with the more spectacular increases in female employees recorded for the industries of group A. Nevertheless with the single exception of plumbing fixtures and allied products, the 1945 female rate for each industry in both groups A and B is the highest of the 10-year period.

*Comment.*—Changes in the magnitude of an exposed population are important in relation to the population's experienced sickness rates only insofar as these changes effect material differences in the composition of the group in respect of any biological or nonbiological factors influencing rates. Thus the introduction into an industrial population of large numbers of inexperienced or very young employees, of older workers, or of women is frequently accompanied by increases in the plant's sickness rates. Similarly, the removal from a population of a number of the more fit young men, such as occurs during a war emergency, may result in higher sickness rates. In both instances the composition of the population is shifted to include a larger proportion of persons more likely to be absent from work on account of disability. During periods of economic depression, on the other hand, decreases in the number of employees may reflect a decrease in employees more subject to disabling illness. Furthermore, for economic reasons the remaining employees may hesitate to be absent from work on account of sickness unless such absence is absolutely necessary. In such periods, therefore, decreases in the number of employees may be accompanied by decreases in the frequency of recorded disability.

It appears evident in the present experience that the increasing trend of sickness absenteeism in recent years was not limited to industries closely allied to the war effort in which large increases in the number of employees occurred, but was also present in a number of other industries where population changes were relatively slight.

#### ABSENCE DURATION, 1941-45

Data from organizations reporting duration of absence make possible the determination of the frequency of absences lasting a specified number of days or longer. These rates for all sickness and nonindustrial injuries, and for each of three broad sickness groups,

are shown graphically in figure 4 by sex and year, 1941 to 1945, inclusive, minimum absence durations ranging from 8 to 92 days.

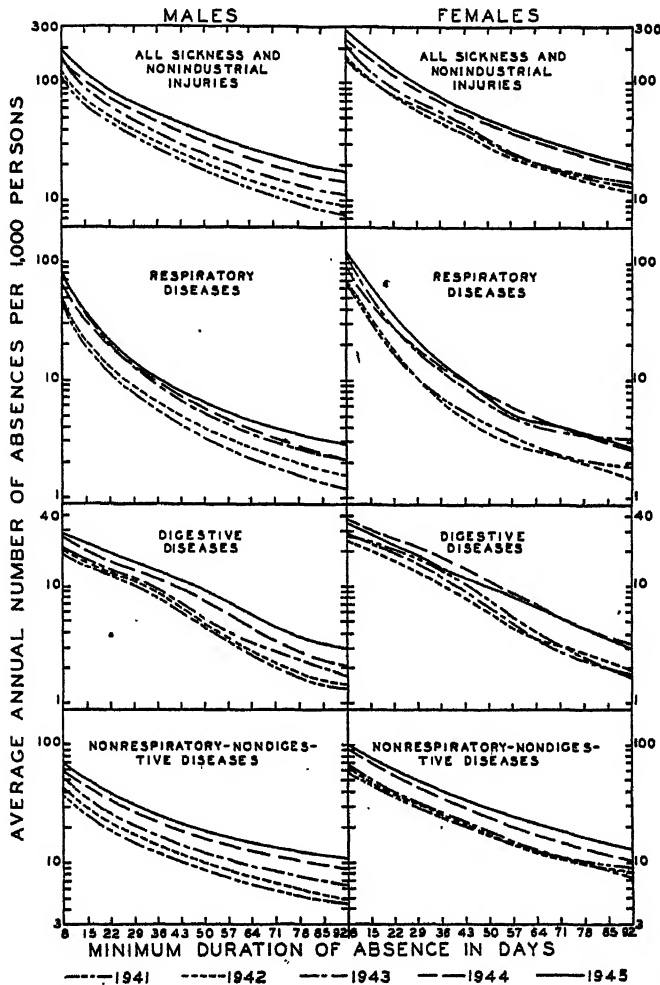


FIGURE 4.—Average annual number of ended absences per 1,000 persons on account of sickness and non-industrial injuries disabling for the specified number of calendar days or longer, for all sickness and non-industrial injuries and 3 broad sickness groups, experience of MALE and FEMALE employees in various industries reporting absences by duration, absences beginning in 1941 to 1945, inclusive. (Vertical logarithmic scale. Nonrespiratory-nondigestive diseases include ill-defined and unknown causes.)

The rates for a particular year indicate the ability of absences beginning in that year to continue to contribute to the frequency rate as the lower limit of duration is increased. Thus the presence of a relatively large number of absences of long duration is reflected in a relatively slow decline in the rates for a particular year.

Of striking interest in figure 4 is the ordering with time of the male rates for digestive and nonrespiratory-nondigestive diseases.

This ordering is reflected in the behavior of the curves for all sickness and nonindustrial injuries, which are similarly ordered except for the frequency of 8-day or longer disabilities in 1943 which exceeds the corresponding rate for 1944.

Among females the 1945 and 1944 curves for all sickness and nonindustrial injuries, and for nonrespiratory-nondigestive diseases, are distinct, each rate for 1944 exceeding the corresponding rates for earlier years, and in turn being exceeded by the rate for 1945.

In each year among both males and females less than 5 percent of the respiratory diseases lasted 3 months (92 days) or longer, the corresponding percentages for digestive and nonrespiratory-nondigestive diseases lying between 5 and 10, and 10 and 15, respectively.

#### RESPIRATORY EPIDEMIC, 1945-46

Information reflecting the respiratory epidemic prevailing in 1945-46 was generously made available by a number of companies. The data include the weekly percentage of employees out sick in a public utility in New York State, and the daily percentage of workers out sick in five plants of one company and in a public utility in Illinois.

*Weekly percentage of workers out sick.*—The weekly percentage of workers out sick in the public utility in New York State covers a 4-month period from the first week in November to the first week in March, data being available for both 1945-46 and 1944-45. The indexes for the 2 years are shown graphically in figure 5. The

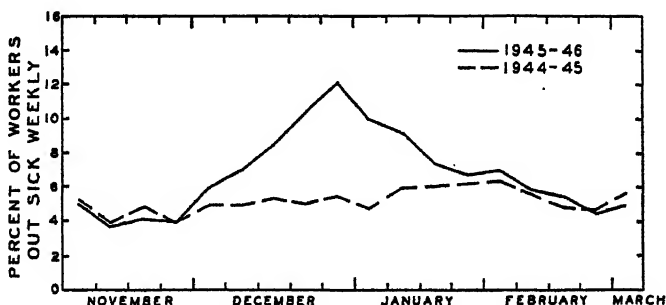


FIGURE 5.—Percentage of workers out sick weekly during specified month of 1945-46 compared with percentage out the corresponding week of 1944-45, experience of employees in a public utility (New York State).

presence of an epidemic occurring principally in December and January of 1945-46 is clearly shown in figure 5. A peak index was reached during the last week in December 1945, when the weekly percentage of workers out sick (12.1) was over twice the corresponding rate for 1944.

*Average daily percentage of workers out sick.*—Figure 6 presents graphically the average percentage of workers out sick daily during the specified weeks of November 1945, to January 1946. The upper part of the figure shows the variation in the index for five plants of one company located as follows: Plant A, Maryland; Plant B, New Jersey; Plant C, Indiana; Plant D, Missouri; and Plant E, Massachusetts. The lower portion of the figure compares the experience of Plant C with that of a public utility in Illinois (Plant F), the two plants being located in the same geographic region.

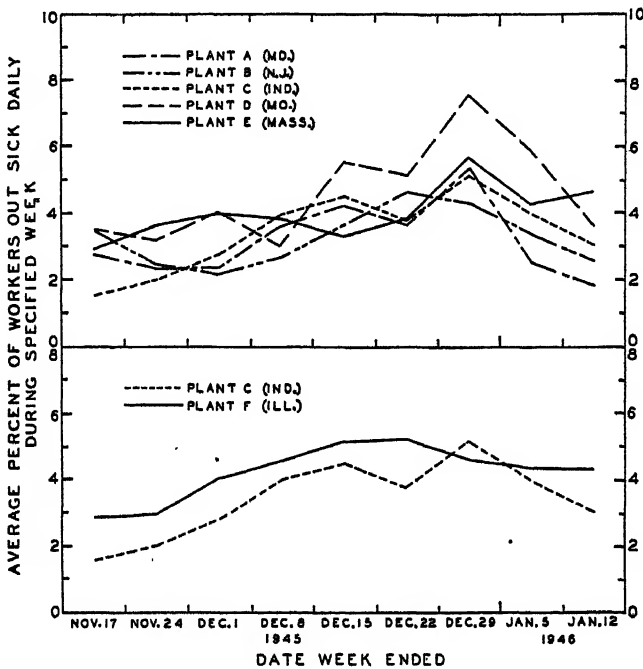


FIGURE 6.—Average percentage of workers out sick daily during specified week, November 1945, to January 1946, experience of employees (1) of five plants of a manufacturing company, and (2) of Plant C (Indiana) compared with a public utility, Plant F (Illinois).

In each of the five plants of the one company the average daily percentage of workers out sick tended to increase from November to the latter part of December, and then began to decrease. In four plants, a peak rate was reached in the week ending December 29, the average indexes ranging from 5.1 percent for Plant C to 7.6 percent for Plant D. For Plant B the maximum rate (4.6) occurred the preceding week.

The movement of the indexes for Plant C in Indiana and the public utility in Illinois, shown in the lower part of figure 6, is not dissimilar. While a peak value of the index for Plant F was reached a week earlier



than for Plant C, the maximum value of the average daily percentage of workers out sick was slightly over five.

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## MALARIA INFECTION ACQUIRED THROUGH BLOOD TRANSFUSION

### Report of a Case

Dr. W. D. Schrack, Jr., Epidemiologist of the Pennsylvania State Department of Health, reports a case of malaria in which the infection was apparently acquired through a blood transfusion.

The patient was admitted to the hospital for an operation on March 18, 1946. A blood transfusion was given to her while on the operating table. The blood was obtained from the hospital blood bank, the donor being a returnee from the armed services. It was subsequently revealed that he had had malaria, with the latest recurrence in January. The date on which the blood was obtained from the donor was not given, but Dr. Schrack states that it is reasonable to assume that it was not many days before the date of transfusion.

The patient was discharged on April 2, with no untoward symptoms. About 3 weeks after the blood transfusion, the patient had a chill, followed by malaise, anorexia, and fever. She was rehospitalized on May 2, and a diagnosis of malaria was made. *Plasmodium vivax* was found in a blood smear. Up to June 10, *Plasmodium* had not been demonstrated in the donor's blood. The patient had always been a resident of Pennsylvania and her history gave no evidence of any previous attack of malaria.

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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REPORTS FROM STATES FOR WEEK ENDED OCTOBER 19, 1946

### Summary

A slight net decline was recorded during the week in the incidence of poliomyelitis, but increases were reported for the South Atlantic and East South Central areas. A total of 977 cases was reported, as compared with 1,042 last week, 722 for the corresponding week in 1944, and a 5-year (1941-45) median of 438. Of the 37 States reporting currently, 5 or more cases, 15 showing increases reported an aggregate of 255 cases (last week 151), while the other 22 States reported 705 (last week 857). The 25 States reporting more than 10 cases each are as follows (last week's figures in parentheses): *Increases*—Vermont 15 (6), Ohio 32 (14), Indiana 29 (23), Michigan 71 (57), North Dakota 24 (14), South Dakota 11 (6), North Carolina 13 (3), Georgia 11 (1), Arkansas 14 (10); *decreases*—Massachusetts 29 (32), Connecticut 14 (17), New York 63 (77), New Jersey 12 (13), Illinois 99 (139), Wisconsin 61 (67), Minnesota 64 (67), Iowa 25 (39), Missouri 57 (70), Nebraska 37 (44), Kansas 70 (71), Oklahoma 16 (17), Texas 18 (21), Colorado 15 (21), Washington 33 (36), California 51 (65).

A total of 385 cases of diphtheria was reported, as compared with 341 last week, 696 for the corresponding week last year and a 5-year median of 656. While the weekly incidence was higher than for last year during the first half of the current year, it has been below since the middle of July, and the cumulative total, 12,513, has for the first time dropped below last year's corresponding figure, 12,551.

The current incidence of typhus fever, 64 cases for the week and 410 for the 5-week period from September 15 to October 19, is less than the corresponding figures of any of the past 5 years. The total for the year to date, 2,888, is less than for the corresponding period of any year since 1941.

Deaths recorded during the week in 91 large cities of the United States aggregated 8,606, as compared with 8,463 last week, 9,311 and 8,893 for the corresponding weeks of 1945 and 1944, respectively, and a 3-year (1943-45) average of 8,919. The cumulative total for the same cities for the year to date is 374,252, as compared with 370,433 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Oct. 19, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med-ian 1941- 45	Week ended—		Med-ian 1941- 45	Week ended—		Med-ian 1941- 45	Week ended—		Med-ian 1941- 45
	Oct. 19, 1946	Oct. 20, 1945		Oct. 19, 1946	Oct. 20, 1945		Oct. 19, 1946	Oct. 20, 1945		Oct. 19, 1946	Oct. 20, 1945	
NEW ENGLAND												
Maine.....	7	0	0	—	—	—	57	—	7	1	0	0
New Hampshire.....	0	0	0	—	—	—	—	—	1	0	0	0
Vermont.....	0	3	0	—	—	—	83	—	1	0	0	0
Massachusetts.....	21	6	5	—	—	—	81	139	96	2	3	3
Rhode Island.....	0	2	2	—	9	—	8	—	—	0	0	1
Connecticut.....	1	0	0	—	—	1	11	18	11	0	1	2
MIDDLE ATLANTIC												
New York.....	22	16	15	13	12	14	111	36	80	2	13	16
New Jersey.....	1	1	3	2	3	3	16	13	22	1	4	4
Pennsylvania.....	15	8	9	1	—	1	134	139	105	4	9	9
EAST NORTH CENTRAL												
Ohio.....	24	17	8	—	6	6	40	8	22	5	5	5
Indiana.....	9	9	12	2	8	3	3	5	5	1	0	0
Illinois.....	6	2	7	5	5	6	12	49	17	3	5	5
Michigan <sup>1</sup> .....	5	15	12	—	2	—	23	104	35	2	4	4
Wisconsin.....	8	2	1	7	18	16	47	15	34	3	0	2
WEST NORTH CENTRAL												
Minnesota.....	6	10	10	—	—	1	—	8	10	2	1	1
Iowa.....	4	8	2	—	—	—	2	3	6	3	1	0
Missouri.....	16	5	5	3	—	—	1	5	4	3	3	3
North Dakota.....	0	2	1	1	2	2	1	1	1	0	0	0
South Dakota.....	2	4	7	—	—	—	—	2	2	0	0	0
Nebraska.....	5	3	0	6	—	—	4	1	4	0	0	0
Kansas.....	10	6	4	—	2	2	4	11	4	1	0	0
SOUTH ATLANTIC												
Delaware.....	0	2	2	—	—	—	3	1	—	0	0	0
Maryland <sup>1</sup> .....	5	14	6	—	3	2	7	1	5	1	1	3
District of Columbia.....	0	0	0	—	1	—	1	2	2	1	1	1
Virginia.....	23	34	33	242	161	138	8	1	4	2	0	1
West Virginia.....	5	14	9	1	—	—	5	—	2	2	0	1
North Carolina.....	13	87	83	—	—	1	12	6	6	0	1	1
South Carolina.....	1	33	33	38	418	272	—	18	16	0	2	2
Georgia.....	11	40	30	9	76	22	7	—	2	0	2	1
Florida.....	17	4	10	9	10	10	1	2	2	2	0	0
EAST SOUTH CENTRAL												
Kentucky.....	23	13	15	—	—	—	2	20	13	1	0	1
Tennessee.....	14	67	25	18	5	7	10	1	6	1	3	3
Alabama.....	15	35	29	24	15	20	4	1	3	2	2	2
Mississippi <sup>1</sup> .....	12	44	18	—	—	—	—	—	—	0	0	1
WEST SOUTH CENTRAL												
Arkansas.....	4	32	15	16	32	20	10	2	4	0	0	0
Louisiana.....	5	15	17	29	—	—	3	—	1	0	0	0
Oklahoma.....	1	12	12	27	73	35	3	7	4	0	0	0
Texas.....	32	61	58	918	1,102	664	24	23	23	4	3	3
MOUNTAIN												
Montana.....	2	4	2	—	1	1	5	22	4	0	0	0
Idaho.....	0	0	0	3	6	—	—	76	3	0	0	0
Wyoming.....	1	0	0	—	—	5	1	5	4	0	0	0
Colorado.....	6	5	8	25	8	10	5	25	11	1	1	0
New Mexico.....	0	2	1	1	1	1	27	—	3	1	0	0
Arizona.....	3	5	1	108	29	50	27	1	3	1	2	0
Utah <sup>1</sup> .....	1	1	0	6	—	2	7	6	6	1	0	0
Nevada.....	0	0	0	—	—	—	1	—	—	0	0	0
PACIFIC												
Washington.....	9	7	7	—	—	—	11	111	22	0	3	2
Oregon.....	1	8	1	2	2	9	18	7	15	1	0	1
California.....	19	33	21	6	8	18	87	181	98	8	3	5
Total.....	385	696	656	1,510	2,008	1,277	922	1,076	1,076	62	73	73
42 weeks.....	12,513	12,551	11,193	200,048	80,601	89,808	644,732	107,387	548,387	5,002	6,918	6,918

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

<sup>3</sup> Delayed report: Arkansas, meningitis, week ended Mar. 2, 4 cases (instead of 3).

Telegraphic morbidity reports from State health officers for the week ended Oct. 19, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever <sup>1</sup>		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	Oct. 19, 1946	Oct. 20, 1945		Oct. 19, 1946	Oct. 20, 1945		Oct. 19, 1946	Oct. 20, 1945		Oct. 19, 1946	Oct. 20, 1945	
NEW ENGLAND												
Maine.....	5	2	0	15	19	19	0	0	0	0	0	0
New Hampshire.....	1	1	2	6	2	7	0	0	0	0	1	0
Vermont.....	15	2	2	8	4	4	0	0	0	0	0	0
Massachusetts.....	29	27	17	40	90	119	0	0	0	4	1	2
Rhode Island.....	6	0	1	6	5	5	0	0	0	0	0	0
Connecticut.....	14	16	8	27	13	22	0	0	0	1	2	0
MIDDLE ATLANTIC												
New York.....	63	66	55	127	174	131	0	0	0	5	9	9
New Jersey.....	12	43	12	29	32	46	0	0	0	1	2	2
Pennsylvania.....	5	37	30	106	131	114	0	0	0	6	4	9
EAST NORTH CENTRAL												
Ohio.....	32	23	14	143	197	158	0	0	0	4	0	10
Indiana.....	29	19	5	52	78	78	0	1	1	5	1	1
Illinois.....	99	42	20	86	97	125	0	0	0	2	2	6
Michigan <sup>2</sup> .....	71	14	11	112	108	101	1	0	0	4	0	3
Wisconsin.....	61	52	15	46	70	70	0	0	0	1	1	1
WEST NORTH CENTRAL												
Minnesota.....	64	14	11	25	39	39	0	0	0	1	1	0
Iowa.....	25	18	4	15	40	40	0	0	0	3	0	3
Missouri.....	57	17	5	17	56	56	1	0	0	8	6	1
North Dakota.....	24	0	1	2	11	9	0	0	0	0	2	2
South Dakota.....	11	0	0	5	2	10	0	0	0	1	0	0
Nebraska.....	37	5	3	16	7	11	0	1	0	0	0	0
Kansas.....	70	14	8	23	41	49	0	0	0	0	1	2
SOUTH ATLANTIC												
Delaware.....	2	0	0	2	4	5	0	0	0	0	3	1
Maryland <sup>3</sup> .....	5	8	7	11	45	37	0	0	0	1	1	2
District of Columbia.....	1	4	4	4	8	14	0	0	0	0	1	0
Virginia.....	5	9	6	39	106	63	0	0	0	3	3	5
West Virginia.....	3	3	3	86	77	77	0	0	0	2	3	3
North Carolina.....	13	11	10	17	95	95	0	0	0	1	1	2
South Carolina.....	1	3	3	1	8	11	0	0	0	1	0	1
Georgia.....	11	10	6	14	31	33	0	0	0	0	2	3
Florida.....	9	9	1	7	7	7	0	0	0	4	3	1
EAST SOUTH CENTRAL												
Kentucky.....	1	3	3	15	55	47	0	0	0	2	10	4
Tennessee.....	8	17	3	31	81	81	0	0	0	1	6	6
Alabama.....	7	3	2	19	24	30	0	0	0	3	6	2
Mississippi <sup>2</sup> .....	8	4	3	12	23	15	1	6	0	6	0	2
WEST SOUTH CENTRAL												
Arkansas.....	14	4	2	5	26	12	0	0	0	2	4	4
Louisiana.....	7	10	1	3	15	9	0	0	0	4	3	3
Oklahoma.....	16	11	2	6	15	15	0	0	0	1	0	4
Texas.....	18	18	13	29	119	47	0	1	0	9	13	14
MOUNTAIN												
Montana.....	2	7	1	2	14	12	0	0	0	0	1	0
Idaho.....	1	1	0	9	19	7	0	0	0	0	1	0
Wyoming.....	0	0	1	3	0	2	0	0	0	0	0	0
Colorado.....	15	3	2	14	21	22	0	0	0	1	2	3
New Mexico.....	4	0	0	9	12	8	0	0	0	2	0	3
Arizona.....	1	1	0	4	6	6	0	0	0	1	3	1
Utah <sup>2</sup> .....	5	5	1	15	10	10	0	0	0	0	0	0
Nevada.....	0	0	0	1	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	33	15	10	16	37	37	0	0	0	0	1	1
Oregon.....	6	1	3	13	19	18	0	0	0	0	0	1
California.....	51	46	19	93	187	116	0	0	0	10	3	4
Total.....	977	618	438	1,386	2,280	2,089	3	9	9	100	103	121
42 weeks.....	21,667	11,463	10,757	94,441	146,271	111,119	300	295	645	3,464	4,166	4,739

<sup>2</sup> Period ended earlier than Saturday.

<sup>3</sup> Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection) 3; Connecticut 1; Ohio 1; Michigan 3; North Carolina 1; Tennessee 1; Louisiana 1; California 1.

<sup>4</sup> Corrected reports: Poliomyelitis, week ended Sept. 23, North Carolina, 10 cases (instead of 11); Arkansas, 26 (instead of 25); Georgia, week ended September 21, 3 cases (instead of 4).

*Telegraphic morbidity reports from State health officers for the week ended Oct. 19, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.*

Division and State	Whooping cough			Week ended Oct. 19, 1946							
	Week ended—		Median 1941-45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Oct. 19, 1946	Oct. 20, 1945		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine.....		28	12								
New Hampshire.....	1	7	7								
Vermont.....	6	10	19								2
Massachusetts.....	118	136	94		2						1
Rhode Island.....	18	15	15		1						3
Connecticut.....	25	46	46								
MIDDLE ATLANTIC											
New York.....	126	263	263	9	16		1				13
New Jersey.....	99	151	134	1						2	2
Pennsylvania.....	118	198	198								6
EAST NORTH CENTRAL											
Ohio.....	60	77	143	1							3
Indiana.....	9	37	17	1			2				6
Illinois.....	78	79	105	2				1	1		7
Michigan <sup>1</sup> .....	217	111	212		2						1
Wisconsin.....	164	93	161				1				10
WEST NORTH CENTRAL											
Minnesota.....	7	6	41	1							2
Iowa.....	3	4	15								51
Missouri.....	7	2	13			1					2
North Dakota.....			3				1				
South Dakota.....		1	2								2
Nebraska.....	1	3	6								
Kansas.....	14	12	24								1
SOUTH ATLANTIC											
Delaware.....	6	3	2					1			
Maryland <sup>1</sup> .....	24	48	48								
District of Columbia.....	7	3	4								
Virginia.....	71	33	24			24					
West Virginia.....	22	6	14			25					1
North Carolina.....	34	40	57								1
South Carolina.....	1	73	50	3	1						1
Georgia.....	6	16	16							14	6
Florida.....	9	4	6			1				6	2
EAST SOUTH CENTRAL											
Kentucky.....	15	22	24								1
Tennessee.....	9	25	25	1					2	2	3
Alabama.....	2	9	16								2
Mississippi <sup>1</sup> .....										1	2
WEST SOUTH CENTRAL											
Arkansas.....	9	10	15	1	4				5	1	
Louisiana.....	7	1	2	1	1					7	
Oklahoma.....		5	5	1							2
Texas.....	93	84	97	10	122	23			1	16	25
MOUNTAIN											
Montana.....	4	1	14				1				
Idaho.....		4	4								
Wyoming.....	1		4								
Colorado.....	9	15	19								
New Mexico.....	5	1	6		5	5					
Arizona.....	41	11	7			25					
Utah <sup>1</sup> .....	6	5	13						1		
Nevada.....		12	5								
PACIFIC											
Washington.....	12	29	29			6					2
Oregon.....	8	14	14					1			
California.....	67	140	140	2	10			8		4	4
Total.....	1,539	1,893	2,329	34	164	111	14	2	10	64	155
Same week, 1945.....	1,893			45	291	164	21	5	4	110	89
Average, 1943-45.....	1,876			46	475	171	16	* 1		* 110	
42 weeks: 1946.....	80,438			71,958	713,503	5,469	529	* 546	* 761	2,888	* 4,235
1945.....	102,802			1,570	21,285	9,423	542	450	621	4,065	3,869
Average, 1943-45.....	111,781		147,130	1,600	18,039	7,838	560	* 441	589	* 3,479	

<sup>1</sup> Period ended earlier than Saturday.

\* 5-year median, 1941-45.

<sup>2</sup> Correction: Texas, week ended June 29, dysentery, amebic, 46 (instead of 397); bacillary, 397 (instead of 46).

<sup>3</sup> Delayed report: Arkansas, July, 2 tularemia, 1 undulant fever, Rocky Mountain spotted fever March, included in cumulative total only.

Anthrax: New Jersey 1 case.

Psittacosis: California 1 case.

WEEKLY REPORTS FROM CITIES<sup>1</sup>

City reports for week ended Oct. 12, 1946

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State and City	Diphtheria cases	Etiopathitis, infections, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0		0	2	0	2	0	0	3
New Hampshire:												
Concord	0	0		0		0	0	0	0	0	0	
Massachusetts:												
Boston	4	0		0	3	0	4	10	9	0	1	24
Fall River	0	0		0		0	0	0	1	0	0	
Springfield	0	0		0	5	0	0	0	1	0	0	13
Worcester	0	0		0		0	10	5	2	0	0	17
Rhode Island:												
Providence	0	0		0		1	2	0	1	0	0	29
Connecticut:												
Bridgeport	0	0		0		0	1	0	0	0	0	2
Hartford	0	0		0		0	1	4	0	0	0	
New Haven	0	0		0	3	1	0	0	3	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	3	0		0		0	1	0	3	0	0	15
New York	14	0	2	1	7	3	43	38	18	0	1	44
Rochester	0	0		0	1	0	0	4	6	0	0	
Syracuse	0	0		0		1	1	3	6	0	0	7
New Jersey:												
Camden	0	0		0		0	0	0	0	0	0	
Newark	0	0		0	3	0	3	0	7	0	0	21
Trenton	1	0	1	1		0	6	1	1	0	1	1
Pennsylvania:												
Philadelphia	1	0	1	0	1	1	13	3	13	0	0	23
Pittsburgh	0	0	1	2	22	1	11	4	12	0	0	1
Reading	0	0		0		0	2	0	1	0	0	4
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0		0	2	1	2	1	9	0	0	3
Cleveland	1	0	1	1	16	1	4	5	14	0	0	8
Columbus	1	0		0	1	0	0	1	8	0	0	1
Indiana:												
Fort Wayne	0	0		0		0	3	0	0	0	0	2
Indianapolis	3	0		0	1	0	4	3	12	0	0	12
South Bend	0	0		0		1	0	0	1	3	0	0
Terre Haute	0	0		0		0	1	0	0	0	0	
Illinois:												
Chicago	1	0	1	1	8	0	25	34	24	0	0	52
Springfield	0	0		0	1	0	2	1	0	0	0	1
Michigan:												
Detroit	0	0	1	1	5	1	8	20	21	0	0	77
Flint	0	0		0		0	4	0	0	0	0	3
Grand Rapids	0	0		0	1	0	1	4	3	0	0	11
Wisconsin:												
Kenosha	0	0		0		0	0	1	0	0	0	
Milwaukee	0	0		0	2	0	3	7	9	0	0	32
Racine	0	0		0		0	1	6	1	0	0	
Superior	1	0		0		0	0	2	0	0	0	
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	1	0	0	5	1	0	0	1
Minneapolis	6	0		0		0	1	10	6	0	0	
St. Paul	0	0		0		0	7	2	5	0	0	5
Missouri:												
Kansas City	0	0		0		0	3	12	5	0	0	3
St. Joseph	0	0		0		0	0	0	0	0	0	
St. Louis	0	0		0	4	0	4	20	4	0	1	

<sup>1</sup> In some instances the figures include nonresident cases.

## City reports for week ended Oct. 13, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0	-----	0	-----	0	7	13	1	0	0	-----
Kansas:												
Topeka.....	1	0	-----	0	-----	0	0	1	0	0	0	-----
Wichita.....	0	0	-----	0	2	0	3	3	0	0	0	-----
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	-----	0	0	0	2	0	0	2
Maryland:												
Baltimore.....	1	0	-----	0	1	1	0	0	4	0	0	14
Cumberland.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Frederick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0	1	1	1	0	5	1	1	0	0	9
Virginia:												
Lynchburg.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Richmond.....	0	0	1	1	4	0	0	0	1	0	0	1
Roanoke.....	9	0	-----	0	2	0	0	0	0	0	0	-----
West Virginia:												
Charleston.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Wheeling.....	0	0	-----	0	-----	0	1	1	0	0	0	-----
North Carolina:												
Wilmington.....	1	0	-----	0	2	0	2	0	0	0	0	-----
Winston-Salem.....	0	0	-----	0	7	0	4	0	2	0	0	5
South Carolina:												
Charleston.....	0	0	15	0	-----	0	2	0	3	0	0	-----
Georgia:												
Atlanta.....	0	0	1	0	1	0	1	1	2	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	1	0	1	0	0	-----
Savannah.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Florida:												
Tampa.....	4	0	-----	0	1	0	1	1	1	0	0	-----
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	1	0	1	0	4	1	2	0	0	5
Nashville.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Alabama:												
Birmingham.....	1	0	-----	0	-----	0	3	1	1	0	0	-----
Mobile.....	2	0	-----	0	-----	0	3	1	1	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	0	1	0	1	1	1	0	0	-----
Louisiana:												
New Orleans.....	6	0	1	1	1	0	*2	3	0	0	1	*7
Shreveport.....	1	0	-----	0	-----	0	4	1	0	0	0	-----
Texas:												
Dallas.....	1	0	-----	0	-----	0	2	1	1	0	0	4
Galveston.....	0	0	-----	0	-----	0	3	0	0	0	0	-----
Houston.....	0	0	-----	0	-----	0	6	2	1	0	0	-----
San Antonio.....	0	0	-----	0	-----	0	7	0	0	0	0	-----
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Great Falls.....	0	0	-----	0	-----	0	0	2	1	0	0	-----
Helena.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Missoula.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Colorado:												
Denver.....	1	0	4	0	4	1	8	3	3	0	1	10
Pueblo.....	0	0	-----	0	-----	0	0	1	1	0	0	-----
Utah:												
Salt Lake City.....	0	0	-----	0	3	0	0	0	2	0	0	-----

\*Includes reports from V. D. Isolation and Charity Hospital; figures not used in computing rates.

## City reports for week ended Oct. 19, 1946.—Continued

	Diphtheria cases	Enccephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	1	0	-----	0	2	0	2	1	1	0	0	-----
Spokane.....	0	0	-----	0	1	0	2	2	0	0	0	-----
Tacoma.....	0	0	-----	0	1	0	0	1	2	0	0	1
California:												
Los Angeles.....	3	0	-----	0	7	2	0	17	22	0	0	8
Sacramento.....	1	0	-----	0	-----	0	0	3	2	0	1	-----
San Francisco.....	1	0	-----	0	2	0	3	2	3	0	0	2
Total.....	72	0	32	10	132	15	252	282	280	0	7	480
Corresponding week, 1945.....	76	-----	18	7	239	-----	252	-----	386	0	14	522
Average, 1941-45.....	79	-----	50	13	239	-----	238	-----	460	0	25	780

\* 3-year average, 1943-45.

\* 5-year median, 1941-45.

Dysentery, amebic.—Cases: New York 1; Chicago 2.

Dysentery, bacillary.—Cases: New York 3; Chicago 1; Detroit 1; Baltimore 2; San Antonio 2; Los Angeles 9.

Dysentery, unspecified.—Cases: Baltimore 1; San Antonio 4.

Rocky Mountain spotted fever.—Cases: New York 1.

Typhus fever, endemic.—Cases: St. Louis 1.

Typhus fever, epidemic.—Cases: New York 2; Newark 1; Philadelphia 1; Kansas City 2; Tampa 2; Little Rock 3; New Orleans\* 14; Houston 2; Los Angeles 2.

\*Includes reports from V. D. Isolation, and Charity Hospital.

## Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 54,288,600)

	Diphtheria case rates	Enccephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	10.5	0.0	0.0	0.0	29	5.3	52.5	49.9	50	0.0	2.6	236
Middle Atlantic.....	8.8	0.0	2.3	1.9	16	3.8	35.3	24.5	31	0.0	0.9	54
East North Central.....	4.9	0.0	1.8	1.3	23	1.8	35.3	52.3	63	0.0	0.0	123
West North Central.....	14.1	0.0	0.0	0.0	14	0.0	50.3	144.8	44	0.0	2.0	18
South Atlantic.....	24.9	0.0	29.8	3.3	31	1.7	31.5	6.6	30	0.0	0.0	51
East South Central.....	23.6	0.0	5.9	0.0	6	0.0	59.0	17.7	30	0.0	0.0	30
West South Central.....	23.0	0.0	2.9	2.9	6	0.0	93.0	23.0	9	0.0	2.9	16
Mountain.....	8.3	0.0	33.0	0.0	58	8.3	90.9	90.9	58	0.0	8.3	99
Pacific.....	9.5	0.0	0.0	0.0	21	3.2	11.1	41.1	55	0.0	1.6	17
Total.....	11.0	0.0	4.9	1.5	20	2.3	39.0	43.0	43	0.0	1.1	74



# PLAGUE INFECTION IN EL DORADO, KERN, AND SAN BENITO COUNTIES, CALIF.

Plague infection has been reported proved in fleas from rodents in El Dorado, Kern, and San Benito Counties, Calif., as follows:

*El Dorado County.*—A pool of 18 fleas from 3 tamarack squirrels, *Sciurus douglasii albolimbatus*, shot at Eagle Falls Public Camp, El Dorado National Forest, Emerald Bay, Lake Tahoe, received at the laboratory September 19 and proved October 9, 1946.

*Kern County.*—A pool of 400 fleas from 45 ground squirrels, *C. beecheyi*, shot 1½ miles east and ½ mile north of Lebec, east side of Castair Lake, received at the laboratory September 17 and proved positive October 14, 1946.

*San Benito County.*—Pools of 397 fleas from 18 ground squirrels taken July 6, and 266 fleas from 18 ground squirrels taken July 1, from a ranch 5 miles east of Tres Pinos; pool of 200 fleas from 56 ground squirrels, taken July 2, 7 miles east and 3 miles north of Tres Pinos; pool of 1,200 fleas from 57 ground squirrels taken July 3, and a pool of 705 fleas from 73 ground squirrels, taken July 5, 7 miles east of Tres Pinos. All ground squirrels were of the same species, *C. beecheyi*.

## TERRITORIES AND POSSESSIONS

### Hawaii Territory

*Plague (rodent).*—Under date of October 15, 1946, plague infection was reported in tissue from a rat (*Rattus hawaiiensis*) trapped on March 13, 1946, in District 14B, Haakakai Gulch, Island of Maui, T. H.

\* \* \*

## DEATHS DURING WEEK ENDED OCT. 12, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 12, 1946	Correspond- ing week, 1945
Data for 93 large cities of the United States:		
Total deaths.....	8,585	8,380
Average for 3 prior years.....	8,488	
Total deaths, first 41 weeks of year.....	371,107	366,622
Deaths under 1 year of age.....	743	591
Average for 3 prior years.....	635	
Deaths under 1 year of age, first 41 weeks of year.....	26,643	24,891
Data from industrial insurance companies:		
Policies in force.....	67,300,227	67,291,661
Number of death claims.....	11,206	9,008
Death claims per 1,000 policies in force, annual rate.....	8.7	7.0
Death claims per 1,000 policies, first 41 weeks of year, annual rate.....	9.6	10.1

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended September 28, 1946.*—During the week ended September 28, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Que- bec	On- tario	Mani- toba	Sas- katch- ewan	Al- berta	British Colum- bia	Total
Chickenpox.....			2	55	103	23	6	23	33	245
Diphtheria.....		5	1	24	4	5	3		2	44
Dysentery, bacillary.....					5			3	1	1
German measles.....		2							2	12
Influenza.....		7			42			2		51
Measles.....		30		114	50	27	24	36	9	296
Meningitis, meningococ- cus.....		1		2	1				2	6
Mumps.....		1		8	61	23	41	16	113	263
Poliomyelitis.....	1	5	10	95	25	4	1		1	142
Scarlet fever.....	1	1	8	84	45	13	1	5	6	114
Tuberculosis (all forms).....		7	7	121	54	48	7	69	31	344
Typhoid and paraty- phoid fever.....			1	11	5		2		2	21
Undulant fever.....					1					1
Venereal diseases:										
Gonorrhea.....	2	15	30	99	141	42	33	35	116	513
Syphilis.....		14	17	83	83	17	10	4	52	280
Other forms.....									5	5
Whooping cough.....		16		50	39	4	4			113

### FINLAND

*Notifiable diseases—August 1946.*—During the month of August 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	12	Paratyphoid fever.....	413
Diphtheria.....	900	Poliomyelitis.....	31
Dysentery.....	39	Scarlet fever.....	116
Gonorrhea.....	2,031	Syphilis.....	503
Malaria.....	17	Typhoid fever.....	78

## NORWAY

*Notifiable diseases—June 1946.*—During the month of June 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	11	Mumps.....	166
Diphtheria.....	312	Paratyphoid fever.....	8
Dysentery, unspecified.....	10	Pneumonia (all forms).....	1,287
Erysipelas.....	439	Polio-myelitis.....	22
Gastroenteritis.....	4,149	Rheumatic fever.....	138
Gonorrhea.....	934	Scabies.....	3,080
Hepatitis, epidemic.....	352	Scarlet fever.....	582
Impetigo contagiosa.....	2,846	Syphilis.....	168
Influenza.....	1,712	Tuberculosis (all forms).....	458
Lymphogranuloma inguinale.....	2	Well's disease.....	1
Malaria.....	3	Whooping cough.....	2,990
Measles.....	580		

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*China.*—Cholera has been reported in certain provinces of China as follows: Anhwei Province—August 11–20, 1946, 450 cases, 12 deaths, August 21–31, 1946, 243 cases, 3 deaths, September 1–10, 1946, 140 cases, 5 deaths; Kiangsu Province—Shanghai—September 11–20, 1946, 50 cases, 7 deaths, September 21–30, 1946, 25 cases, 5 deaths; Kwangtung Province—Canton—September 11–20, 1946, 17 cases, 4 deaths.

*Manchuria—Kirin Province.*—Cholera has been reported in Kirin Province, Manchuria, as follows: August 1–10, 1946, 1,159 cases, 652 deaths, August 11–20, 1946, 1,054 cases, 426 deaths, August 21–31, 1946, 61 cases, 12 deaths.

#### Typhus Fever

*Guatemala.*—For the month of August 1946, 95 cases of typhus fever with 16 deaths were reported in Guatemala. Departments reporting the highest incidence are: Solola, 58 cases, 6 deaths; Quezaltenango, 6 cases, 2 deaths; Huehuetenango, 5 cases, 4 deaths; Chimaltenango, 5 cases; Sacatepequez, 2 cases, 1 death.

*Philippine Islands—Manila.*—For the week ended September 21, 1946, 3 cases of murine typhus fever were reported in Manila, Philippine Islands.

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

**G. ST. J. PERROTT, *Chief of Division***

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

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## EDITORIAL

### HEALTH SERVICES FOR FEDERAL EMPLOYEES <sup>1</sup>

Passage of Public Law 658 by the Seventy-ninth Congress makes possible the establishment of a preventive medical program for Federal employees. Heads of departments and agencies of the Federal Government including Government-owned and -controlled corporations, after consulting with the United States Public Health Service and after consideration of its recommendations, may establish employee health programs for the purpose of promoting and maintaining the physical and mental health of the employees of the Federal Government.

The United States Public Health Service for many years has made studies of specific industrial and occupational hazards and has furnished professional advice upon request to private industry and to agencies of the Federal Government. Many industrial organizations and commercial establishments have found that employee health programs have paid dividends in increased efficiency and productivity. It is anticipated that a preventive medical program operated by the several Federal departments and agencies should prove of great value in helping employees to perform their assigned duties efficiently and economically.

"A Suggested Plan for a Preventive Medical Program in a Federal Employees' Health Service" has been formulated and is presented in detail in the following pages of Public Health Reports. This plan is subject to modification from time to time in accordance with the evolution of preventive medicine.

<sup>1</sup> From the Bureau of Medical Services.



# A SUGGESTED PLAN FOR A PREVENTIVE MEDICAL PROGRAM IN A FEDERAL EMPLOYEES' HEALTH SERVICE <sup>1</sup>

## FOREWORD

The essential elements believed to be desirable for a preventive medical program in a Federal employees' health service at this time are set forth.

It is hoped that the plan suggested will be of assistance in developing, establishing and operating employees' health services such as are consistent with the provisions of Public Law 658.

## I. PURPOSE

A Federal employees' health service program has two major objectives:

A. To serve the employee—the Federal employee (a taxpayer)—by assisting him to maintain optimal health while on the job.

B. To serve the employer—the Government (all taxpayers)—by increasing, or maintaining, production through the establishment and maintenance of methods and standards which make it possible for the employee to maintain optimal health in his total work environment.

The major objectives should be consistent with: (1) the function of the agency or department; (2) the Federal Government's responsibility as fixed by Public Law 658, Seventy-ninth Congress—hereafter referred to as the Act; (3) the Federal Government's responsibility as fixed by the Employees' Compensation Act of 1916 as amended; (4) the employee's relationship to his family physician and dentist; (5) the codes of ethics of the medical, dental and nursing professions.

## II. AUTHORIZATION

[PUBLIC LAW 658—79TH CONGRESS]

[CHAPTER 865—2D SESSION]

[H. R. 2716]

AN ACT

To provide for health programs for Government employees

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, for the purpose of promoting and maintaining the physical and mental fitness of employees of the Federal Government, the heads of departments and agencies, including Government-owned and -controlled corpora-*

<sup>1</sup> From the Office of Employees' Health, Bureau of Medical Services, United States Public Health Service.

tions, are authorized, within the limits of appropriations made available therefor, to establish, by contract or otherwise, health service programs which will provide health services for employees under their respective jurisdictions: *Provided*, That such health service programs shall be established only after consultation with the Public Health Service and consideration of its recommendations, and only in localities where there are a sufficient number of Federal employees to warrant the provision of such services, and shall be limited to (1) treatments of on-the-job illness and dental conditions requiring emergency attention; (2) preemployment and other examinations; (3) referral of employees to private physicians and dentists; and (4) preventive programs relating to health: *Provided further*, That the health program now being conducted by the Tennessee Valley Authority and by the Panama Canal and Panama Railroad Company shall not be affected by the provisions of this Act: *And provided further*, That such health programs as are now being conducted for other Federal employees may be continued until June 30, 1947. The Public Health Service, when requested to do so, shall review the health service programs being conducted by any department or agency under authority of this Act and shall submit appropriate comment and recommendations. Wherever the professional services of physicians are authorized to be utilized under this Act, the definition of "physician" contained in the Act of September 7, 1916, as amended (U. S. C., 1940 edition, title 5, sec. 790), shall be applicable.

Approved, August 8, 1946.

### III. INTERPRETATION OF THE ACT

A. In accordance with the authority contained in the Act of August 8, 1946, the heads of departments and agencies, including Government-owned and -controlled corporations, within the limits of appropriations made available therefor, may establish by contract or otherwise health services for employees under their respective jurisdictions according to any one, or combination, of the following:

1. Establish and operate their own health service programs;
2. Contract for the establishment and operation of their health service programs utilizing:

- a) other competent Federal agencies or departments;
- b) private or public organizations capable of rendering the services required;

3. Establish and operate in part their own health service programs and contract in part for the services authorized.

B. The scope of the health service programs as established in Public Law 658 is:

1. "Treatment of on-the-job illness and dental conditions requiring emergency attention;
2. "Preemployment and other examinations;
3. "Referral of employees to private physicians and dentists;
4. "Preventive programs relating to health."

## IV. PROPOSED STANDARDS AND RECOMMENDATIONS

The Public Health Service recommends that:

A. Type of program, personnel needs, functional organization—

1. All employees' health service programs be preventive health programs.

2. The professional responsibility for the health service programs be vested in the physician in charge of the agency's employees' health service.

3. The physician in charge of the employees' health service program of a department or agency, including Government-owned and -controlled corporations, be directly responsible at the level of the principal administrative officer of the department or agency, including Government-owned and -controlled corporations.

The position taken by the Public Health Service at this time in regard to the placement of a Federal employees' health service in the functional organization of an agency or department is as follows:

(a) The department or agency head, because of the responsibility inherent in his position, has the right to place the health service at the level he deems proper in his own department or agency.

(b) The Public Health Service, as the result of its experience with industry, advises that the placement of the health service be at a high level, such as is occupied by the principal administrative officer in a department or agency.

(c) The Public Health Service does not intend to designate the placement of the health service under any specific official, whether that official be an administrative officer, a personnel officer, or a budget officer, because this is a prerogative of the head of the department or agency.

The Act places the administrative responsibility for the health service program in the head of the Government department or agency, including Government-owned and -controlled corporations.

4. The nurse in charge of a nursing service be administratively and professionally responsible to the chief physician of the agency, and collaborate with him in fulfilling the broad areas of the program. In agencies where there is no physician in charge of the employees' health service program, the nurse in charge of the nursing and health service be administratively responsible at the level of the principal administrative officer of the department, or agency, including Government-owned and -controlled corporations.

5. The professional personnel—physicians, dentists, nurses, and other professional personnel—operating in, and in relation to, the health service program be of high professional caliber and capabilities which comply with the professional standards established by the Civil Service Commission for professional personnel engaged in a preventive medical program. In instances where professional personnel are members of the commissioned corps of the Army, the

Navy, or the Public Health Service, or are those engaged in programs of the Veterans' Administration, professional standards be those established within each respective service organization herein named for personnel engaged in preventive medical programs within each respective service.

The number of physicians, dentists, nurses, and adjunctive specialists and supporting personnel as set forth below provides a flexible base from which to initiate services. With such a beginning, modification either by addition or subtraction may be made to suit factors in each specific location.

6. The number of physicians per unit of population be one physician for 4,000 to 6,000 employees.<sup>2</sup>

Factors to be considered in determining a more exact ratio of physicians to population include among others:

- (a) distribution of employees geographically;
- (b) shifts worked;
- (c) extent of industrial hazards present;
- (d) employee turnover;
- (e) number of health examinations required;
- (f) size of employee population;
- (g) sex and age distribution of the employee group;
- (h) type of work being done;
- (i) degree of group isolation from other medical and dental services;
- (j) degree of accessibility of the health service to the employee;
- (k) degree of employees' understanding of the purpose and availability of the health services.

7. The number of dentists per unit of population be determined following a review and evaluation of need in relation to a preventive dental program in accord with the Act.

The factors listed above concerning the ratio of physicians per unit of population are generally applicable to the ratio of dentists per unit of population.

8. The number of nurses per unit of population be that recommended for industry, namely:<sup>3</sup>

- 1 nurse for up to 300 employees;
- 3 nurses for the first 1,000 employees;
- 1 nurse for each additional 1,000 employees, up to 5,000 employees;
- 1 nurse for each further additional 2,000 employees.

The factors which influence the number of nurses required per unit of population are essentially the same as those which influence the number of physicians required. Furthermore, when a preventive

<sup>2</sup> This ratio is an estimate based on existing practices in industry, with consideration for the real difference existing between the type of preventive medical program authorized by Public Law 658 and industrial medical programs. The ratio is based on the potential work load of the physician in preventive medical programs.

<sup>3</sup> Report of the Committee to Study the Duties of Nurses in Industry of the Public Health Nursing Section of the American Public Health Association, PUBLIC HEALTH NURSING, July 1943, p. 394.

medical program is to evolve from existing emergency room first-aid services, it is essential that a gradual infiltration of appropriately qualified public health nurses be effected at all levels in the functional organization of the respective Federal employees' health service. Infiltration may, and in many instances should, be accomplished by two processes: First, by adding an appropriate number of public health nurses to the program in the beginning, for the purpose of effecting supervisory guidance and instruction of incumbent staff, and for the purpose of effectuating the desired evolution; and second, by filling all vacancies as they occur in the natural course of events by appropriately qualified public health nurses in order to sustain the desired evolution.

It is hoped provision may be made whereby incumbent nurse personnel in emergency room first-aid services are given the opportunity and encouraged to secure appropriate professional education and appropriate professional experience whereby they may qualify as public health nurses.

9. The number of technicians, stenographers, and clerical personnel per unit of population be determined upon the basis of the potential treatment load of the professional personnel of the health unit, and upon the degree of accessibility of available Federal and local facilities for medical technical work for each agency.

10. In special instances where circumstances warrant, advisers in the fields of Health Education, Nutrition Education, Sanitary Engineering, and other adjunctive services be added to the basic professional staff of the individual employee health service.

11. Health service programs now (August 8, 1946) being conducted may be continued until June 30, 1947. After June 30, 1947, in those departments and agencies including Government-owned and -controlled corporations where the health service program plans have not been completed and appropriations secured, "temporary interim programs" with a physician in charge, or with a registered nurse in charge be continued until the head of the department or agency can complete the necessary plans, obtain approval, and secure appropriations for a permanent health service program.

Congressional authority in a department's or agency's appropriation act will be necessary to continue the operation of "temporary interim programs" after June 30, 1947. The language of the respective appropriation acts should specifically identify the type of health service to be conducted by the department or agency as being either (a) a temporary interim health service, or (b) a preventive medical service.

12. "Temporary" health service programs be established on a nursing level until such time as plans are approved, and appropri-

tions secured for permanent health service programs under the direction of a qualified physician. Looking toward the development of programs authorized by the Act, and under the existing authority for the employing of registered nurses, heads of departments and agencies, including Government-owned and -controlled corporations, employ nurses who are qualified in accordance with Civil Service Commission standards for nurse personnel in preventive medical programs. Nurses of the commissioned corps of the Army, the Navy, or the Public Health Service and nurses employed by the Veterans' Administration assigned to Federal employees' health services should meet the standards set by the respective above-named Services for nurse personnel in preventive medical programs.

13. The space made available for health service units be adequate in all respects for conducting an effective health service program.

14. The supplies and equipment provided be sufficient for the existing demands.

15. The records in all health service programs be properly maintained on prescribed standard forms. Individual case records of medical, dental, and nursing services be retained in the health unit and be regarded as confidential material. Interpretive reports be available for official usage.

16. The reporting procedures in all health service programs conform to prescribed standard requirements in order that valid statistical comparisons may be made.

17. Nurses be provided with professionally acceptable written standing orders.

18. The health unit be the focal point concerning the health of the employee and the related employee health matters of the department or agency. All activities relating to employee health matters be centralized in the health unit's professional personnel. All health counseling be conducted by the appropriate professional personnel of the health unit.

19. Illness and injury incurred in performance of duty or proximately caused by employment are properly the responsibility of the Bureau of Employees' Compensation, and the prescribed regulations pertaining thereto be followed inasmuch as Public Law 658 is not interpreted as superseding the Compensation Act of September 7, 1916, amended.

20. The health program for the individual department or agency and Government-owned and -controlled corporation be considered as one over-all health service for the total employee population, and the health service be financed at the departmental level for the total department or agency and for its constituent subdivisions, including

individual bureaus, divisions and constituent administrative units thereof.

21. An adequate maid and janitor service be provided in relation to the needs of the health service unit.

22. Each department and agency utilize to the utmost existing available Federal and local facilities, in relation to the operation of the various phases of the health service programs, for consultation and for health educational purposes.

23. In instances where employees of one agency are stationed in a building in which another agency operates a health service, and in instances where employees of an agency are located within easy access of another agency's health service, effort be made by the agencies concerned to effect a contract whereby the existing health services may be utilized by the agencies concerned. The resources of the Bureau of the Budget and the United States Public Health Service be utilized as needed in effecting this arrangement. In order to facilitate maximum utilization of Federal employees' health services as proposed above, the Public Health Service, acting upon the request of the Bureau of the Budget, shall establish and maintain a currently active, central registry of all health services operating in Federal departments and agencies including Government-owned and -controlled corporations. This registry shall be used for the purpose of effecting coordination, and for providing the Bureau of the Budget with information and identification data.

24. Where agencies are not large enough to justify health service programs of their own, cooperative arrangements be worked out with other Federal agencies.

25. Health service programs be established in the metropolitan area of Washington, D. C., first. At a later date a program for the field be developed.

26. Plans be effectuated whereby appropriate health service will be provided to those groups of employees for whom it is not feasible to provide complete service as herein outlined, due to the factor of isolation and/or the small size of the group.

**B. The health program and scope of service—**

The basic health program comprising medical, dental and nursing service shall include the following:

1. Promotion of the individual employee's optimal health.
2. Diagnostic and advisory services.
3. Treatment, medical and dental, as defined by the Act.
4. Prevention of disease.
5. Analysis of statistics and services.
6. Maintenance of all medical records of employees as confidential medical information.

7. Interpretation of findings to personnel and management officials and collaboration with personnel officials in planning, initiating and carrying out various over-all aspects of the program.

C. The component parts of each specific phase of the health program be as outlined below—

1. Promotion of the individual employee's health. This be accomplished through the following:

a) Health examinations which include:

- (1) preplacement examinations:
  - (a) original;
  - (b) reassignment;
- (2) periodic examinations as indicated;
- (3) regular annual health examination to include determination of current medical findings (somatic and psychic); current dental findings; chest X-ray; urine analysis and other laboratory work as indicated;
- (4) examination following sickness absenteeism as indicated;
- (5) examinations upon the request made by the employee himself, his superior officer, or the nurse;
- (6) examination of the physically handicapped, followed by medical advice for the purpose of securing proper job placement;
- (7) examinations to determine:
  - (a) fitness for continuing assignment;
  - (b) need for separation and/or health status at time of separation;
  - (c) need for change of duty;
  - (d) need for retirement and/or health status at time of retirement;
  - (e) presence of infectious or communicable disease;
  - (f) presence of conditions of chronic and/or of serious nature;
  - (g) presence of mental illness and/or acute emotional imbalance;
  - (h) degree of progress occurring in cases requiring rehabilitation;
- (8) periodic examination of foreign service personnel following service abroad, with special reference to infectious diseases; recommending appropriate measures and/or determining fitness for continuing the assignment; obtaining from appropriate sources information concerning specific health hazards about to be encountered in service outside the country and recommending precautions to be taken.

b) The preemployment health examination be used as the foundation upon which to develop the health record and future health service for the individual employee within the agency.

c) The professional personnel of the health unit consult with the employee regarding the recorded findings at the time of the health examination in accordance with the physician's directions; health education and guidance, together with periodic follow-up, be carried out by the physician and the nurse on an individual and personalized basis to facilitate effective functioning of the individual, and of the group.

d) The preemployment health record contain the following:

- (1) social and occupational history;
- (2) medical and dental history;
- (3) current dental findings;
- (4) chest X-ray reports;
- (5) current medical findings (somatic and psychic);
- (6) urinalysis report;
- (7) blood serology report;
- (8) hematology report (when indicated);
- (9) an expression of the physician's opinion regarding the employee's probable capacity for making a satisfactory adjustment to the proposed job, and/or to other employment.



e) The practice be initiated and continued whereby the medical records are regarded as confidential medical information and an interpretation of findings is given to personnel and management officials when and as desirable for more effective utilization of manpower as related to: the employees' adjustment to the job; job placement; job adjustment; and maintenance of individual and group health.

f) Sustained collaboration be maintained between the physician, industrial hygiene personnel and the safety engineer, in the study of the total physical work environment of each group of workers for the following purposes:

(1) to determine the nature and extent of hazards which are present, or believed to be imminent;

(2) to plan, initiate, and secure appropriate action for correcting any hazardous situation.

g) The physician be charged with an industrial physician's share of responsibility for detecting the presence of specific occupational hazards, and the presence of tangible and intangible factors within the work environment which are capable of having a deleterious effect upon the health of the worker and his level of productivity.

h) The physician be charged with an industrial physician's share of responsibility for discovering needs, recommending specific measures, and jointly initiating appropriate action for correcting conditions requiring attention.

i) The physician be charged with the full responsibility of a medical specialist in maintaining sustained collaboration and cooperation between the health unit and other appropriate personnel of the agency or department, and in providing the employee with an optimal work environment.

j) The physician and professional staff of the health unit be charged with the responsibility of maintaining a sustained health-education program for the employee population, and separate groups thereof. Appropriate health-education activities be planned, initiated, and carried out by the medical, dental, nursing, and other appropriate professional personnel of the health unit.

k) An industrial mental hygiene program be promoted which is directed at better job adjustment for employees and better placement of employees, concerned with the fitting together of the emotional demands of the job and the emotional assets of the employee. This should be done through a program of education and supervision, at all levels in the functional organization of the agency.

Such programs be carried out with the collaboration and cooperation of the personnel staff.

l) Programs of case finding, communicable disease control, special campaigns such as mass chest X-ray examinations, and similar activities be planned, initiated and carried out by the professional staff of the health unit for the employee population of the agency.

## 2. Diagnostic and advisory service include:

a) Professional evaluation of the employee's symptoms; determination of the true nature of his problem; determination of the significance of his problem in relation to:

- (1) the employee;
- (2) the employee group;
- (3) production levels;
- (4) the community;

b) Guidance of the employee into a fuller understanding of:

- (1) his problem;
- (2) ways of dealing with his problem;
- (3) resources available to him for his use in dealing with his problem;
- (4) appropriate steps to be taken in dealing with his problem.

c) Referral of the employee to physicians and dentists of the employee's own selection for treatment of illness, other than on-the-job illness and dental condition requiring emergency attention.

d) Utilization by the agency physician of the consultation services of the United States Public Health Service and other Federal and local resources, and effective exchange of pertinent information between the agency's employees' health service and the resources mentioned above.

e) Appropriate interpretation of the employee's problem to the superior officer of the employee, and to appropriate personnel officers within the agency who share responsibility for all, or part, of the situation.

3. Medical, dental, and nursing treatment provided to employees include the following:

a) Immediate care of illness and injury incurred in the performance of duty and/or proximately caused by the employment.

b) Subsequent care of such conditions as are authorized by the Bureau of Employees' Compensation under the direction of properly designated authorities.

c) Care of on-the-job illnesses and dental conditions of noncompensable nature which require emergency attention.

d) Emergency care of the employee who is suffering from a serious nonservice-connected illness and/or injury; and prompt arrangement for further medical care for the employee by his private physician and/or dentist, or by a hospital.

e) Special treatments to the individual employee upon the specific request of his local private physician or dentist. The medication and biologicals needed for his treatment to be acquired by the employee at his own expense and supplied by him to the health unit.

f) Professional consultation and health instruction by the physician, the dentist, the nurse, and other appropriate professional personnel on matters relating to the individual's maintenance of optimal health and well-being.

g) Dental treatment include:

(1) immediate care of illness and injury incurred in the performance of duty and/or proximately caused by the employment;

(2) subsequent care of such conditions as are authorized by, and under the direction of, authorities designated by the Bureau of Employees' Compensation;

(3) preemployment and periodic oral examination and diagnosis;

(4) emergency dental treatment necessary for the relief of pain and infection;

(5) adequate recording of findings and recommendations;

(6) referral of the employee for further remedial and restorative care to the private dentist of the employee's selection;

(7) dental health education.

NOTE.—The details concerning the scope and type of dental service to be recommended by the Public Health Service are being developed, and will be presented at a later date.

h) The function of the nursing service include treatment, health counseling, health education, and liaison, as well as administration, and operation of

the individual and/or group of health units. The nurse's responsibility will include performing such services as the following:

- (1) interviewing;
- (2) health counseling;
- (3) health instruction;
- (4) case-finding and follow-up on an individual basis;
- (5) treatment of on-the-job illness and dental condition requiring emergency attention according to standing orders, or other appropriate medical or dental authorization;
- (6) collaboration and participation in planning, initiating and carrying out over-all health education programs, and programs of case-finding on a mass level;
- (7) carrying out under the direction of the supervising physician specific phases of research relating to such as the following:
  - (a) program planning to improve methods;
  - (b) disease prevention;
  - (c) reduction of absenteeism;
- (8) maintaining approved systems of records and reports;
- (9) compiling records and reports;
- (10) cooperating with the physician and/or the dentist during his examination, and/or treatment, of the individual employee;
- (11) appraisal and referral of cases to appropriate available resources;
- (12) acting as liaison between the employee and these resources;
- (13) acting as interpreter, and/or liaison, between the employee and his physician, and/or his dentist; between the agency physician and the employee; between the agency physician and appropriate personnel at various levels in the functional organization of the agency; between the agency physician and personnel of the community resources; and in instances where no physician is in charge of the agency health service, between the total health service and the personnel at all levels in the functional organization of the agency;
- (14) maintaining a professionally correct visiting nurse service program, either as a part of the health unit service or on a contract basis with appropriate available resources, Federal, State, or local.

#### 4. Analysis of statistics and services be made for the purpose of:

- a) Utilizing the preemployment health examination and health records as indices from which to plan and initiate appropriate health measures and health education activities.
- b) Utilizing reports of illness and injury incurred in performance of duty as a basis for initiating appropriate collaboration between the health service and the service of the safety engineer in effecting changes in the environment, and assisting the safety engineer in securing specific and appropriate accident-control and safety-promotion measures.
- c) Securing close approximation and correlation between the services of the health unit, and the services of the personnel office.
- d) Computing accurate cost analyses.

D. Appropriate quarters and facilities be provided by the agency to enable the employees' health service program to fulfill its function:—

1. Each health unit (and substation thereof) be so equipped and so arranged as to:

- a) Promote effective functioning of the individual unit; expedite the flow of work through the unit, and eliminate unnecessary detention of the employee who comes to the unit for health service; and provide a professionally correct environment.
- b) Conserve the time and energy of the employee, and that of the personnel of the health unit.

c) Provide maximum privacy for every employee during examination, treatment, and interview by the professional personnel of the health unit.

d) Provide an adequate reception and waiting room area.

e) Provide a suitable office for each physician, with equipment to include the following basic items:

- 1 examination table;
- 1 instrument cabinet;
- 1 treatment table for holding equipment which is being used by the physician in examining and/or treating the employee;
- 1 desk;
- 2 chairs;
- 1 mirror;
- appropriate professional instruments and equipment; a curtain, swinging from overhead supports, to screen the examination table and to provide a dressing room for the employee prior to and following examination and/or treatment;
- 1 water-toilet and lavatory;
- 1 coat closet.

f) Provide suitable office and work space for each dentist which is adequately equipped to fulfill the functions of the dentist as set forth by the Act.

Details concerning type and quantity of dental equipment to be recommended by the Public Health Service are being worked out and will be presented at a later date.

g) Provide suitable treatment rooms, fully and appropriately equipped for use by the nurse while treating and/or interviewing the employee. Each treatment room be provided with a lavatory fixture with hot and cold running water, treadle controlled, and also a separate lavatory fixture for use by the employee when receiving oral and throat treatment, such as mouthwashes, gargles, and throat irrigations; or into which other contaminated solutions may be discarded, such as solutions from hand soaks, etc. (Having soundproof treatment rooms is essential so that the employee may be provided with the opportunity to discuss his problems of a more intimate nature while he is being treated for minor problems, and/or problems of less intimate nature.)

h) Provide at least one treatment room in excess of the number of nurses to be employed in any one unit (this is essential to provide space for treating employees who require soaks and packs, but who need not retain a nurse in constant attention with them.)

i) If laboratory services are required within the agency's health unit, provide a separate appropriately equipped unit or room to serve as a laboratory unit. This unit be so designed and so situated that the operator will be screened from view while working in the laboratory.

The problem of determining what is the most desirable plan for providing laboratory and X-ray service as a part of the employees' health service of the individual department, agency, or Government-owned and -controlled corporation is a problem which is unique for each individual and each specific location and should be determined with reference to the degree of availability of other appropriate facilities (Federal, State, and local), relative cost in dollars and cents, in employee time and energy, and in the end results to be accomplished.

j) Provide a communal work space or utility room immediately adjacent to the treatment rooms. This utility room space be equipped with:

- (1) a work counter;
- (2) running water (hot and cold) and sink and drainboards (treadle-control faucets);

(3) sufficient cabinet space to accommodate communal equipment and stock supplies;

(4) desk space for the staff nurses at which to write records and compile reports;

(5) file cabinets for filing case records adjacent to the nurse's desk. (Case records should be in close proximity to the treatment rooms and easily accessible to the nurse so that she may review the previous entries on the employee's case record before launching into treatment of his current problem. This is essential inasmuch as groups of symptoms are significant.)

k) Provide the equivalent of two comfortable rest rooms—one for male employees; one for female employees. Each room be equipped with an adequate number of beds.

l) Provide two complete toilet units—one for male, one for female, employees.

m) Provide adequate space to accommodate the required number of clerical workers.

n) Provide necessary storage space for equipment and supplies; and provide enough space for an adequate number of file cabinets.

o) Provide a soundproof office for the chief nurse, of size sufficient to permit its use as a staff-conference room.

p) Provide adequate office space for all other professional personnel who shall be required to hold conferences, or prepare written material, e. g. the assistant chief nurse, the visiting nurse, etc.

q) Provide a nurses' dressing and locker room equipped with an adequate number of lockers, chairs, dressing tables, mirrors, and a complete toilet and lavatory unit (lockers to be of sufficient size to permit the acceptance of heavy street clothes).

r) All health units be provided with standard "Health Unit" signs which are easily discernible and legible at a distance from every approach to the unit.

s) Each health unit be equipped with a drinking fountain.

2. In selecting the location of health units the following features be taken into account:

a) The health unit be centrally located, preferably on the first floor, near an exit which can be reached easily by automobile. If the unit is located above the ground floor, it be within easy access of elevators.

b) The unit be located in an area free from vibration and noise.

c) The unit be situated so as to permit expansion of facilities if and as the need for expansion occurs.

d) The space allocated for the health unit be compact and permit easy flow of work to eliminate bottlenecks and back-tracking.

e) The unit be well lighted and have controlled ventilation and temperature.

3. The pervading tone and quality of the total employees' health service be that created by the influence of high professional standards and a genuine interest in and respect for the personality of the individual employee.

## PREPARATION OF MUMPS VACCINES AND IMMUNIZATION OF MONKEYS AGAINST EXPERIMENTAL MUMPS INFECTION<sup>1</sup>

By KARL HABEL, *Surgeon, United States Public Health Service*

The importance of mumps in military populations has been emphasized by many observers (1, 2). One solution of the problem of the spread of this disease in training camps would seem to be the detection of susceptible individuals and their immunization with a mumps vaccine. Enders et al. (3) have supplied a means of determining susceptibility by the use of a skin test. A source of antigen for skin testing and for possible vaccine production has been made available by the cultivation of the mumps virus in the developing chick embryo as carried out in this laboratory (4).

### Methods and Materials

#### *Source of Antigens*

Infected allantoic fluid harvested in passage of the allantoic-sac sub-strain of egg virus, and infected yolk sacs from the yolk-sac substrain of the same virus (4) have been used as the source of virus in all our vaccine-production experiments. These antigens were kept frozen at  $-70^{\circ}\text{C}$ . in sealed ampules until ready for use. Mumps-infected parotid glands were used as antigens in some of the complement-fixation tests.

#### *Technique of Complement Fixation*

The technique employed throughout these experiments was similar to that previously described (4). Antigen titrations were made against a pool of serums from monkeys in the convalescent stage of mumps, diluted to contain 4 units of complement-fixing antibody per 0.2 cc. of serum. Serum titrations were made against either infected yolk-sac antigen or infected-monkey-parotid-gland antigen diluted to contain four complement-fixing antigen units per 0.2 cc. An acute and a convalescent monkey serum was included in each test, and all serum samples from each monkey were run in the same test. At first, serums from monkeys immunized with egg-virus vaccines were tested against parotid virus; however, it was found that the monkeys did not develop any demonstrable antibodies against yolk-sac tissue as such, and subsequent tests were made with infected yolk sac as antigen.

All monkey serums were inactivated at  $62.5^{\circ}\text{C}$ . for 20 minutes.

End points as recorded are the highest original dilution of serum in which complete (++++) fixation occurred.

<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health.

### ***Method of Virus Neutralization***

A quantitative method of titering the amount of virus-neutralizing antibody in serum samples was developed, the chick embryo being used as the test animal. Undiluted serum and dilutions of 1:2, 1:4, 1:10, 1:25, 1:50, 1:100, or higher by twofold differences were mixed with equal parts of an egg-virus suspension. This mixture was incubated at 37° C. for 1 hour, then kept cold while being inoculated into eggs by the homologous route for the virus substrain used. The egg material was harvested from these eggs after incubation for the usual period for the virus substrain used and was then tested for virus multiplication by an antigen titration against known immune serum in the complement-fixation test. Thus, if the original serum dilution had neutralized the virus mixture, no virus would grow in inoculated eggs and no antigen in the harvested egg would be demonstrated by complement fixation. In the first two vaccine experiments this virus-neutralization test was run against amniotic-fluid virus, and serum-virus mixtures were inoculated into the amniotic sac of the eggs. However, this procedure involved a cumbersome technique, and subsequently the routine procedure involved the use of allantoic-fluid virus diluted to contain 10 minimum infectious doses for the egg, the virus-serum mixtures being inoculated into the allantoic sac.

In all tests, an undiluted serum from a monkey in the acute stage of mumps and a serum diluted 1:10 from a monkey in the convalescent stage were included as controls.

### ***Test of Immunity in Vaccinated Monkeys***

All monkeys were bled for serum before immunization. Ten days after the last dose of vaccine administered to any of the monkeys on a given experiment, they were again bled and given a test dose of virus. Twenty-one days after the test dose a third serum sample was collected. Most of the serums were tested for titer of both complement-fixing and virus-neutralizing antibodies.

The test dose consisted of dilutions of parotid virus obtained from the thirty-seventh and thirty-eighth passages of a strain of virus carried exclusively in monkeys. Two cubic centimeters of virus dilution was injected directly into each Stenson's duct. The monkeys were checked daily during 14 days for fever and parotid swelling. In the tables, fever is denoted as + if 40° C. on 1 day, ++ if over 40° C. on 1 day, +++ if over 40° C. for 2 days, and ++++ if over 40° C. for 3 days or more. Swelling indicated by ± indicates a gland barely palpable deep under the angle of the jaw, + means slight, ++ moderate, +++ marked palpable swelling, and ++++ marked swelling with pitting edema.

With the exception of vaccine experiment No. 1, all monkeys were tested with dilutions of the same frozen virus. Because of the

short incubation period of mumps in monkeys (5 to 7 days) as compared with humans (18 days) and the direct method of inoculation into the parotid duct, it seemed important to know something of the quantity of virus being inoculated in the test dose. The frozen virus therefore was titered in monkeys; table 1 shows that monkeys could be infected with the virus diluted out at least as far as 1:50,000, so that in all the vaccine experiments the monkeys were being tested with at least 10 to 100 M. I. D.

TABLE 1.—*Titer of test dose<sup>1</sup> virus used in vaccine experiments*

Dilution	Monkey	Reaction		Complement-fixation titer	
		Fever	Swelling	Before	After
1:5.....	393	+++	+++	-----	-----
	413	0	+++	0	1:16
1:500.....	395	+++	+++	0	1:16
	408	+++	+	0	1:16
	353	++	++	0	1:16
	324	+	++	0	1:32
1:5,000.....	A40	0	++	1:2	1:64
	371	0	+	0	1:64
	411	+	++	0	1:16
	424	0	++	-----	-----
1:50,000.....	249	0	++	0	1:16
	335	0	+	0	1:128

<sup>1</sup> 2 cc. of virus dilution inoculated into each Stenson's duct.

### **Purification and Concentration of Virus**

*Virus titer.*—As earlier experiments demonstrated that the yolk-sac virus titered to  $10^{-6}$  in eggs and allantoic-sac virus (4) to  $10^{-5}$ , these two egg substrains were taken as the source of antigen for the preparation of vaccines.

*Ether extraction.*—Preliminary experiments showed that in ether extraction of yolk-sac virus the relatively purified aqueous phase contained the same titer of antigen by complement-fixation titration as the original material.

*Precipitation of virus by pH change.*—Antigen titrations of yolk-sac virus after being brought to various pH levels and the comparative amounts of antigen in the resulting precipitates showed that a pH of 6.0 or lower apparently destroyed the antigen and that pH 6.2 was the level at which the greatest precipitate was formed without destruction of the antigen.

*Precipitation of virus on the urates of infected allantoic fluid.*—If infected allantoic fluid is centrifuged when harvested it is a clear solution. However, when frozen and thawed the dissolved urates precipitate out, and part of the virus adheres to this precipitate. In preliminary experiments the precipitates were brought back to original volume before being run in a complement-fixation titration. Both



with allantoic fluid alone and mixed with yolk sac most of the virus present adhered to the urate precipitate.

### *Inactivation of Virus*

It was shown previously (4) that mumps virus in yolk-sac suspensions was killed by exposure to  $1\frac{1}{2}$  volumes of ether at  $4^{\circ}$  C. for 30 minutes, and also that as little as 0.2 second's exposure to ultraviolet light<sup>2</sup> would inactivate the virus. Both these methods of killing virus, however, preserved the antigen so that complement-fixation titers remained unchanged.

### *Use of Adjuvants in Vaccines*

In order to slow up the absorption of the antigen in the vaccine, the antigen in some experiments was emulsified with 4 percent beeswax made up in either mineral oil or peanut oil, following the directions of Romansky (5) who used this technique for slowing the rate of absorption of penicillin.

### *Preparation and Testing of Vaccines*

*Experiment 1.*—Vaccine No. 1 was prepared from a 10-percent whole emulsion of yolk-sac virus in saline inactivated by ultraviolet light. The original yolk sac had a complement-fixation titer of 1:64. Two monkeys received three doses of 2 cc. each given 1 week apart by the subcutaneous route. As shown in table 2, when tested with a heavy dose of virus one monkey developed moderate parotid swelling and the other was protected, whereas the two control monkeys showed marked swelling. As a result of vaccination, the monkeys developed titers of 1:32 and 1:8 by complement fixation, and their undiluted serum neutralized virus. Three weeks after the test dose of virus the complement-fixation titers reached 1:128 and virus neutralization took place with serum diluted to 1:100.

*Experiment 2.*—Vaccine No. 2 was prepared from a 10-percent yolk-sac suspension in saline. The original complement-fixation titer was 1:8. It was extracted with  $1\frac{1}{2}$  volumes of anhydrous ether for 30 minutes at  $4^{\circ}$  C. The ether was removed by suction from the aqueous phase and the latter was given to two monkeys in three 2-cc. doses subcutaneously at intervals of 1 week.

Vaccine No. 3 was a 10-percent suspension of the same yolk sac as that used for vaccine No. 2 but infected allantoic fluid (complement-fixation titer 1:2) was used as the diluent instead of saline. This suspension was ether-extracted, and the aqueous phase was injected into two monkeys on the same dosage schedule.

Table 2 shows that following challenge virus all the monkeys developed a parotitis except one of the two receiving vaccine No. 3. None of the monkeys had any complement-fixing antibody as a result of vaccination. The serums of both monkeys receiving vaccine No. 2 neutralized virus when undiluted, that of the unprotected monkey receiving vaccine No. 3 had no neutralizing antibody, while that of the protected monkey neutralized virus at a 1:10 dilution. Both complement-fixing and virus-neutralizing titers increased after the test dose.

*Experiment 3.*—Vaccine No. 4 was prepared from undiluted allantoic fluid inactivated by ultraviolet irradiation. The same allantoic fluid (complement-fixation titer of 1:2) was used to make a 10-percent suspension of yolk sac (titer of 1:16); it was angle-centrifuged and the supernatant irradiated to make vaccine

<sup>2</sup> Oppenheimer-Levinson type of ultraviolet lamp and exposure chamber.

No. 5. Part of this same supernatant was frozen and thawed and then angle-centrifuged, the urate precipitate made back to one-tenth the original volume, and then irradiated to make vaccine No. 6. Vaccine No. 7 was made from another part of the supernatant of yolk-sac-in-allantoic-fluid, precipitated at pH 6.2, and the precipitate made back to one-tenth the original volume and then irradiated. (chart 1A).

TABLE 2.—*Monkeys immunized with mumps vaccines challenged with mumps virus inoculated into Stenson's ducts*

Experiment 1

Vaccine	Doses (2 cc.)	Monkey	Test dose <sup>1</sup>			Complement-fixation titers			Serum-neutralization titers		
			Dilution	Fever	Swelling	Before vaccine	Before test	After test	Before vaccine	Before test	After test
No. 1. 10-percent whole irradiated yolk sac.	3 at 1-week intervals.	420	1:5	+	±	0	1:32	1:128	0	1:1	1:100
	do.	394	1:5	++	++	0	1:8	1:128	0	1:1	1:100
Controls.		309	1:5	0	+++		0	1:16			
		407	1:5	+++	++++						

Experiment 2

No. 2. 10-percent yolk sac supernatant ether extract.	3 at 1 week intervals.	352	1:500	+	++	0	0	1:32	0	1:1	-----
	do.	354	1:500	+	+++	0	0	1:128	0	1:1	-----
No. 3. 10-percent yolk sac in allantoic fluid ether extract.	do.	343	1:500	0	++	0	0	1:32	0	0	1:50
	do.	361	1:500	0	±	0	0	1:64	0	1:10	1:50
Controls.		300	1:500	0	++		0	1:64		0	1:25
		291	1:500	0	++		0	1:256		0	1:25
Immunes.		309	1:500	0	0		1:32	1:128		1:10	1:100
		413	1:500	0	0		1:16	1:256		1:10	1:100

Experiment 3

No. 4. Allantoic fluid, irradiated.	3 at 1-week intervals.	346	1:5,000	0	0	0	0	1:256	0	1:1	1:50
No. 5. Yolk sac in allantoic fluid, irradiated.	do.	357	1:5,000	0	0	0		1:64	0	1:1	1:50
	do.	365	1:5,000	++	±	0	0	1:64	0	0	1:25
No. 6. Yolk sac in allantoic fluid urate precipitate, irradiated.	do.	342	1:5,000	++	0	1:2	1:2	1:256	0	0	1:200+
	do.	360	1:5,000	+	+	0	0	1:256	0	0	1:50
No. 7. Yolk sac in allantoic fluid pH 6.2 precipitate, irradiated.	do.	339	1:5,000	+	0	0	1:2	1:128	0	1:1	1:50
		348	1:5,000	++	+	0	0	1:256	0	1:4	1:50
No. 8. Yolk sac in allantoic fluid ether extract.	do.	384	1:5,000	0	+	0	1:8	1:64	1:1+	1:100	1:200+
No. 9. Yolk sac in allantoic fluid pH 6.2 precipitate in 4-percent beeswax mineral oil ether extract.	1 at 1-week intervals.	355	1:5,000	++	++	0	0	1:16	0	1:4	1:400
	do.	359	1:5,000	0	++	0	0	1:32	0	1:4	1:200
Controls.		324	1:5,000	+	++		0	1:32			0
		353	1:5,000	++	++		0	1:16			0
		291	1:5,000	+	±		1:256	1:256		1:100	1:50 <sup>2</sup>
Immunes.		300	1:5,000	0	0		1:64	1:256		1:100	1:25 <sup>2</sup>

<sup>1</sup> 2 cc. virus dilution inoculated into each Stenson's duct.

<sup>2</sup> Serums tested after prolonged storage at 4° C.

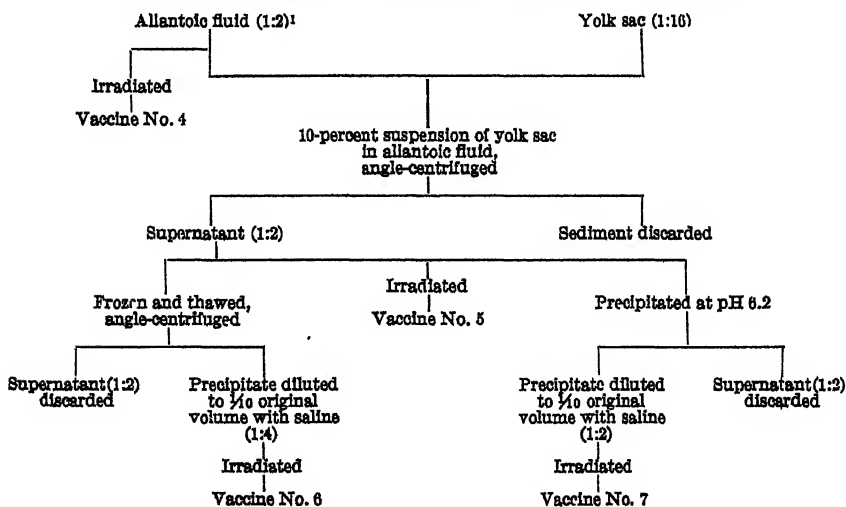
TABLE 2.—*Monkeys immunized with mumps vaccines challenged with mumps virus inoculated into Stenson's ducts—Continued*

## Experiment 4

Vaccine	Doses (2 cc.)	Mon-key	Test dose <sup>1</sup>			Complement-fixation titers			Serum neutralization titers		
			Dilution	Fever	Swelling	Be-fore vac-cine	Be-fore test	After test	Be-fore vac-cine	Be-fore test	After test
No. 10. Yolk sac and allantoic fluid precipitate in oil, irradiated.	1 at 1-week intervals.	348	1:5,000	+	0	0	1:128	1:512	1:25	1:200	1:400
	-----do-----	A 57	1:5,000	+	0	0	1:8	1:512	0	1:10	1:800
	2 at 3-week intervals.	A 42	1:5,000	+	±	1:2	1:64	1:128	0	1:50	1:400
	-----do-----	A 44	1:5,000	++	0	0	1:128	1:512	0	1:10	1:400
	-----do-----	A 61	1:5,000	0	++	0	1:32	1:128	0	1:25	1:200
No. 11. Yolk sac and allantoic fluid precipitate in saline, irradiated.	-----do-----	A 58	1:5,000	0	±	0	1:64	1:64	0	1:4	1:200
	-----do-----	A 59	1:5,000	0	+	0	1:16	1:32	0	1:25	1:100
Controls	-----do-----	A 52	1:5,000	0	+	-----	0	1:32	-----	1:1	1:25
	-----do-----	A 54	1:5,000	0	++	-----	0	1:32	-----	1:1	1:100

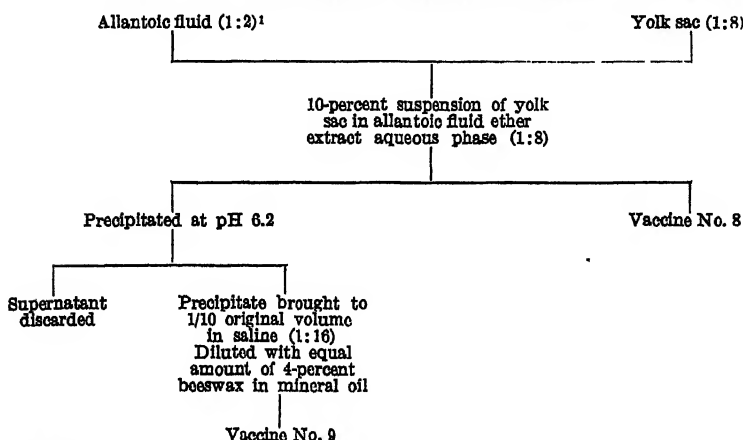
<sup>1</sup> 2 cc. virus dilution inoculated into each Stenton's duct.

Vaccines No. 8 and No. 9 were made from a 10-percent suspension of yolk sac (titer 1:8) in allantoic fluid (titer 1:2). This suspension was extracted for 30 minutes at 4° C. with 1½ volumes of anhydrous ether and the ether was removed from the aqueous phase by suction to make vaccine No. 8. The remaining aqueous phase was then precipitated at pH 6.2, the precipitate being brought back to one-tenth the original volume. Vaccine No. 9 was made by diluting this precipitate with an equal amount of 4-percent beeswax in mineral oil (chart 1B).

CHART 1A.—*Preparation of antigens for vaccines. Experiment 3*<sup>1</sup> Antigen titer by complement fixation.

In table 2 are shown the results of immunization of monkeys with these vaccines. Protection against parotid swelling of significant degree, following challenge, was given by all vaccines except No. 9. Complement-fixation and serum-neutralization titers after immunization were irregular and quantitatively low for all monkeys except No. 384.

CHART 1B.—*Preparation of antigens for vaccines. Experiment 3*



<sup>1</sup> Antigen titer by complement fixation.

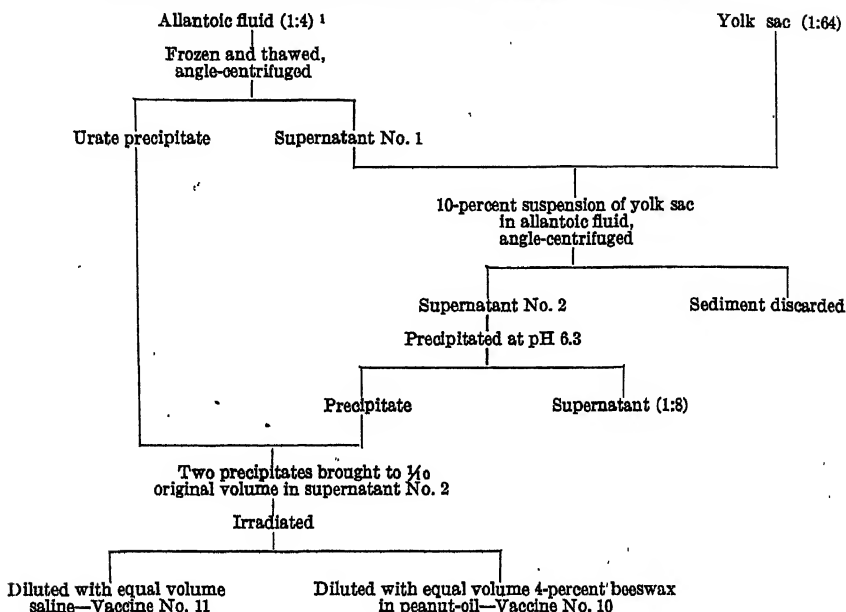
This monkey apparently had become immune to mumps before the vaccine was given since his serum neutralized virus before the vaccine was administered and the neutralizing antibody titer went to 1:100 after vaccine and over 1:200 after the test dose.

*Experiment 4.*—Allantoic fluid (titer 1:4) was frozen, then thawed, and the urate precipitate was saved. The supernatant was used as the diluent in making up a 10-percent suspension of yolk sac (titer 1:64) which was angle-centrifuged and the supernatant brought to pH 6.3. The resulting precipitate was added to the urate precipitate and the two were brought back to one-tenth original volume with the 10-percent yolk-sac supernatant.

This precipitate suspension was then irradiated. Vaccine No. 11 was made by diluting the suspension with an equal volume of saline, while No. 10 was made by diluting the same suspension with 4-percent beeswax in peanut oil (chart 2).

Two monkeys received only one dose each of vaccine No. 10, and three monkeys received two doses each at intervals of 3 weeks. Two additional monkeys received two doses of vaccine No. 11. Only one of the monkeys which had received two doses of vaccine No. 10 responded to the test dose of virus with significant parotid swelling and all developed relatively high complement-fixation (1:8 to 1:128) and neutralization-antibody titers (1:4 to 1:50) after immunization (table 2). After the test dose the complement-fixation titers increased and the neutralization titers reached the highest levels yet encountered in monkeys (1:100 to 1:800).

The antibody response of monkey No. 343 is interesting. This monkey was included in the experiment by error. Actually he was already immune from a previous experiment. His immunity was demonstrated in the 1:25 titer of neutralizing antibody before he was given any vaccine. However, after but one dose of vaccine this titer was up to 1:200 and went to 1:400 after the test virus inoculation.

CHART 2.—*Preparation of antigens for vaccines. Experiment 4*

<sup>1</sup> Antigen titer by complement fixation.

### Discussion

Enders et al. (6) have made a mumps vaccine using infected-monkey-parotid-gland suspensions inactivated with formalin as their antigen. Tests in monkeys were performed in which the complement-fixation titer of portions of the parotid glands (harvested a fixed time after test virus inoculation) was the criterion of protection. By this criterion there was some evidence of increased resistance, but virus multiplication took place in spite of immunization. No mention was made of parotid swelling in immunized as compared with control animals. Stokes et al. (7) used this parotid vaccine in humans who were subsequently inoculated with live virus as a test dose. An accelerated response was described in vaccinated individuals and there were two failures, but no figures are given as to the total number vaccinated.

In the experiments reported herein, the production of an immune state in vaccinated monkeys was demonstrated by three methods. By the first method the monkeys were protected against the development of clinical parotid swelling in response to monkey-passage mumps virus inoculated directly into Stenson's ducts. As pointed out by Enders, this method of testing for immunity in the monkey is probably a much more severe test than that which occurs in humans under the conditions of natural infection. The virus is introduced directly into

the parotid gland instead of having to invade that tissue by a more indirect route; and more important, perhaps, is the shorter incubation period in the monkey, giving very little time for the animal to effect an antibody response over the basic level previously established by the vaccination.

The second method of evaluating the immunity produced by the vaccination of monkeys was the determination of antibody response to the vaccine. (It is felt that virus-neutralizing antibodies are of more significance in reflecting actual immunity than are complement-fixing antibodies.) In these experiments, as the result of immunization, both types of antibodies were brought to levels comparable to those found in convalescent animals. In experiment 4, the virus-neutralizing antibody titers following vaccine varied from 1:4 to 1:50, whereas in uncomplicated mumps in humans the titer in convalescent serums averages from 1:4 to 1:10 (tested in individual and in pooled convalescent serum prepared commercially).

The virus-neutralizing antibody rise which occurs following the test dose of virus in immunized animals was the third means of demonstrating their immune state. The titer of virus-neutralizing antibody rose to 1:100 or higher (highest 1:800) within 3 weeks after the test virus. This rise was the same in the vaccinated monkeys as in monkeys already immune to mumps because of previous infection, and was significantly higher than that found in control monkeys following their first infection.

The results with the vaccines prepared in different ways were fairly uniform in respect to the prevention of parotid swelling after test virus inoculation. However, antibody responses to those vaccines employing beeswax in oil as an adjuvant were definitely higher than to the same antigens made up in saline. In fact, there was evidence to indicate that titers following one dose of the antigen mixed with adjuvant were greater than after two or three doses of those made up in saline. There were no clear-cut differences in the results following the use of antigens inactivated with ether as compared to those inactivated by ultraviolet irradiation.

These chick-embryo-antigen vaccines are now being given a clinical trial for the prevention of mumps in man.

#### Summary and Conclusions

Mumps vaccines were prepared from infected chick-embryo yolk sacs and allantoic fluid.

Concentration and clarification of the antigens were accomplished by ether extraction, by precipitation of urates, and by precipitation through pH change.

Virus was inactivated by exposure to ether and to ultraviolet irradiation.

Immunity to mumps in monkeys following immunization with these vaccines was demonstrated by the absence of parotid swelling following test virus inoculation and by the antibody response to vaccine.

Vaccine antigen mixed with beeswax in oil as an adjuvant appeared to be superior to saline suspensions in producing immunity.

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### SICKNESS ABSENTEEISM AMONG INDUSTRIAL WORKERS, FIRST QUARTER OF 1946<sup>1</sup>

By W. M. GAFARER, *Principal Statistician, United States Public Health Service*

The accompanying data on 8-day or longer disabilities experienced by male employees during the first quarter of 1946 are derived from periodic reports from industrial sick benefit associations, company relief departments, and group health insurance plans. The reports cover approximately 200,000 males in various industries.

#### FIRST QUARTER, 1946

Annual frequency rates by specific cause of disability are given in table 1 for the first quarters of 1946, 1945, and 1944. During the

<sup>1</sup> From the Industrial Hygiene Division, Bureau of State Services. The report for the year 1945 appeared in PUBLIC HEALTH REPORTS (1).

first quarter of 1946 the average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for eight calendar days or longer is 152.4, a rate 11 percent below the corresponding frequency for 1945.

TABLE 1.—Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for eight consecutive calendar days or longer, by cause, experience of MALE employees in various industries, first quarter of 1946 compared with first quarters of 1945 and 1944<sup>1</sup>

Cause (numbers in parentheses are disease title numbers from International List of Causes of Death, 1939)	Annual number of absences per 1,000 males for the first quarter		
	1946	1945	1944
Sickness and nonindustrial injuries.....	152.4	171.3	171.8
Nonindustrial injuries (169-195).....	12.6	16.3	12.1
Sickness.....	139.8	155.0	159.7
Respiratory diseases.....	70.0	74.3	94.2
Tuberculosis of respiratory system (13).....	.9	.8	.6
Influenza, grippé (33).....	35.5	27.5	52.8
Bronchitis, acute and chronic (106).....	8.6	13.8	11.5
Pneumonia, all forms (107-109).....	6.6	7.7	11.1
Diseases of pharynx and tonsils (115b, 115c).....	4.9	7.8	6.5
Other respiratory diseases (104, 105, 110-114).....	13.5	17.2	11.7
Digestive diseases.....	17.1	21.0	17.4
Diseases of stomach except cancer (117, 118).....	5.1	7.7	5.9
Diarrhea and enteritis (120).....	2.1	2.6	2.2
Appendicitis (121).....	3.0	4.2	4.2
Hernia (122a).....	3.2	2.6	1.7
Other digestive diseases (115a, 115d, 116, 122b-129).....	3.7	3.9	3.4
Nonrespiratory-nondigestive diseases.....	48.5	54.0	42.2
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44) <sup>2</sup> .....	3.4	3.5	2.4
Rheumatism, acute and chronic (58, 59).....	5.4	7.3	5.9
Neurasthenia and the like (part of 84d).....	1.8	2.5	1.8
Neuralgia, neuritis, and sciatica (87b).....	3.2	4.1	3.0
Other diseases of nervous system (80-85, 87, except part of 84d, and 87b).....	2.0	2.5	1.6
Diseases of heart and arteries, and nephritis (90-99, 102, 130-132).....	3.4	9.0	7.6
Other diseases of genitourinary system (133-138).....	3.5	3.5	3.4
Diseases of skin (151-163).....	3.6	3.7	2.8
Diseases of organs of movement except diseases of joints (156b).....	4.0	4.2	3.2
All other diseases (45-57, 60-79, 83, 89, 100, 101, 103, 154, 155, 156a, 157, 162).....	13.2	13.7	10.5
Ill-defined and unknown causes (200).....	4.2	5.7	5.9
Average number of males.....	195,927	228,282	253,610

<sup>1</sup> Industrial injuries and venereal diseases are not included.

<sup>2</sup> Exclusive of influenza and grippé, respiratory tuberculosis, and venereal diseases.

In general it will be observed in table 1 that the rates for 1946 are lower than the corresponding rates for 1945, decreases of 23, 6, 19, and 10 percent, respectively, being shown in the 1946 rates for nonindustrial injuries, respiratory diseases, digestive diseases, and nonrespiratory-nondigestive diseases. An increase, however, of almost 30 percent is yielded for the 1946 frequency of influenza and grippé, but the rate (35.5 absences per 1,000 males) is still some 33 percent below the rate recorded for the first quarter of 1944 (52.8). On the basis of the present data, the epidemic of influenza and grippé known to have occurred in the winter of 1945-46 (1) appears relatively less severe than the epidemic of 1943-44 (2).



## FIRST QUARTERS, 1937-46

The variation of first-quarter rates for the broad cause groups, and influenza and gripe over the 10 years 1937-46 is shown graphically in figure 1. Attention is directed to (1) the generally increasing trend

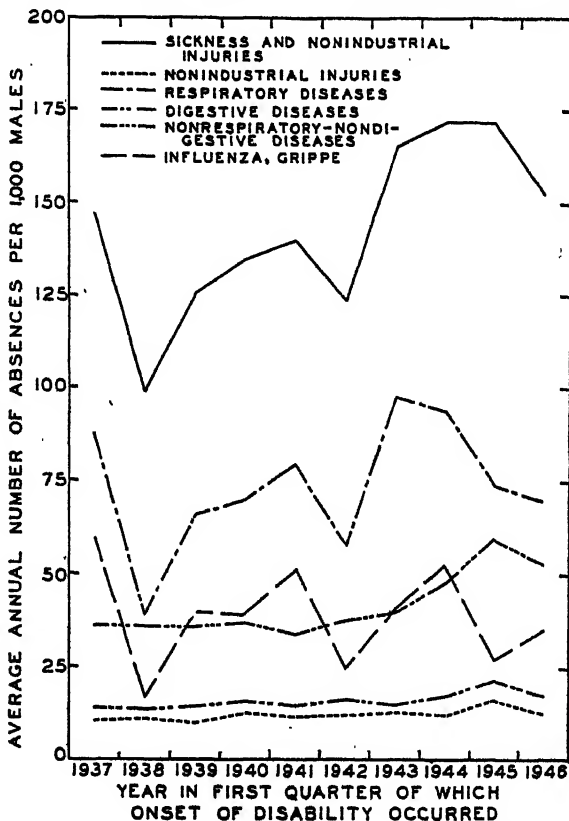


FIGURE 1.—Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by broad cause group; variation of first-quarter rates with time; experience of MALE employees in various industries, 1937 to 1946, inclusive.

over the 10 years in the frequency of all disabilities, (2) the decrease since 1943 in the frequency of the group of respiratory diseases, and (3) the 1946 rate for nonrespiratory-nondigestive diseases which is exceeded only by the corresponding rate for 1945 and is over 25 percent above the mean rate for the 10-year period.

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# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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REPORTS FROM STATES FOR WEEK ENDED OCTOBER 26, 1946

### Summary

The sharpest decline in the weekly incidence of poliomyelitis for the year to date was recorded for the current week. A total of 716 cases was reported, as compared with 977 last week, a 5-year (1941-45) median of 363, and 581 for the corresponding week in 1944. Decreases occurred in all of the 9 geographic divisions except the Mountain and the Middle Atlantic areas, where increases in the latter area were reported in New York and Pennsylvania. Of the 31 States reporting 5 or more cases, 20 reported a decrease (701 to 432), while only 7 reported increases (151 to 192). States reporting more than 10 cases currently are as follows (last week's figures in parentheses): *Increases*—New York 79 (63), Pennsylvania 15 (5), Iowa 28 (25), California 54 (51); *decreases*—Ohio 18 (32), Indiana 21 (29), Illinois 96 (99), Michigan 48 (71), Wisconsin 26 (61), Minnesota 45 (64), Missouri 31 (57), Nebraska 19 (37), Kansas 28 (70), Arkansas 11 (14), Texas 14 (18), Colorado 13 (15), Washington 18 (23); *no change*—Massachusetts 29 (29). The total for the year to date is 22,373, as compared with 17,437 for the corresponding period of 1944 and a 5-year median of 11,120.

Current figures for diphtheria, influenza, measles, meningococcus meningitis, Rocky Mountain spotted fever, scarlet fever, smallpox, typhoid and paratyphoid fever, endemic typhus fever, and whooping cough are below the respective corresponding 5-year medians. The cumulative figures for scarlet fever and typhoid fever are below any corresponding figures of the past 5 years, and those for endemic typhus fever for the past 4 years and for meningococcus meningitis for the past 3 years. Because of the high incidence earlier in the year, the cumulative figures for diphtheria, influenza, and measles are above the respective 5-year medians.

A total of 8,739 deaths was recorded during the week in 93 large cities of the United States, as compared with 8,743 last week, 8,814 and 9,004, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,918. The total for the year to date is 388,589, as compared with 384,867 for the corresponding period of last year.

*Telegraphic morbidity reports from State health officers for the week ended Oct. 26, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria		Influenza			Measles			Meningitis, meningococcus			
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Oct. 26, 1946	Oct. 27, 1945		Oct. 26, 1946	Oct. 27, 1945		Oct. 26, 1946	Oct. 27, 1945		Oct. 26, 1946	Oct. 27, 1945	
NEW ENGLAND												
Maine.....	0	0	0	—	—	—	70	2	2	1	1	2
New Hampshire.....	0	0	0	—	—	—	18	—	1	0	0	0
Vermont.....	0	0	0	—	—	—	49	—	1	0	0	0
Massachusetts.....	24	3	3	—	—	—	185	210	171	0	5	5
Rhode Island.....	0	0	0	—	9	—	2	—	9	0	0	1
Connecticut.....	1	1	0	4	—	—	25	9	9	2	2	2
MIDDLE ATLANTIC												
New York.....	24	21	16	13	14	14	85	37	71	5	11	17
New Jersey.....	4	6	6	4	7	4	30	17	22	1	3	4
Pennsylvania.....	12	8	13	2	2	1	127	198	112	5	3	7
EAST NORTH CENTRAL												
Ohio.....	11	58	20	4	4	5	92	8	23	4	10	4
Indiana.....	14	25	17	—	18	14	9	5	5	0	1	1
Illinois.....	6	10	12	4	2	7	18	120	23	7	8	8
Michigan <sup>1</sup> .....	1	13	10	—	1	1	36	107	39	2	3	3
Wisconsin.....	3	4	2	8	16	16	34	21	43	1	2	2
WEST NORTH CENTRAL												
Minnesota.....	8	9	8	—	—	—	5	2	4	2	4	1
Iowa.....	4	3	2	—	—	—	1	3	7	4	0	0
Missouri.....	11	5	5	8	—	5	—	3	3	0	7	5
North Dakota.....	4	4	1	—	—	—	—	2	2	2	0	0
South Dakota.....	1	0	1	—	—	—	1	—	2	0	1	1
Nebraska.....	7	3	2	2	—	1	1	3	6	0	0	0
Kansas.....	5	4	4	—	2	—	2	15	15	0	2	1
SOUTH ATLANTIC												
Delaware.....	0	1	1	—	—	—	1	—	—	0	0	0
Maryland.....	15	20	6	2	2	2	6	3	5	0	0	2
District of Columbia.....	1	0	0	1	1	1	3	3	2	0	1	1
Virginia.....	13	39	39	194	102	177	26	19	19	2	0	4
West Virginia.....	2	17	14	6	—	8	5	—	3	1	0	0
North Carolina.....	20	108	59	—	—	2	25	3	10	1	1	2
South Carolina.....	1	36	30	49	558	211	1	28	6	0	0	0
Georgia.....	15	51	33	5	29	19	15	4	4	0	2	2
Florida.....	13	9	13	4	1	2	2	5	2	1	0	1
EAST SOUTH CENTRAL												
Kentucky.....	31	24	11	—	9	1	—	41	6	2	1	1
Tennessee.....	18	53	15	4	22	15	9	2	5	4	1	3
Alabama.....	15	39	41	44	79	30	3	2	3	5	5	2
Mississippi <sup>1</sup> .....	14	42	17	—	—	—	—	—	—	0	0	1
WEST SOUTH CENTRAL												
Arkansas.....	20	26	20	15	57	28	8	4	4	3	3	1
Louisiana.....	7	32	5	—	10	2	2	3	1	0	2	1
Oklahoma.....	15	9	9	22	40	40	3	4	4	4	0	0
Texas.....	29	78	78	930	1,176	737	54	34	17	6	6	2
MOUNTAIN												
Montana.....	1	4	2	—	1	—	20	17	9	0	0	0
Idaho.....	0	1	0	4	5	2	5	60	9	0	0	0
Wyoming.....	0	0	0	—	—	—	2	1	1	0	0	0
Colorado.....	3	8	9	23	38	28	7	68	11	0	1	0
New Mexico.....	2	1	1	—	3	1	4	2	2	0	1	1
Arizona.....	2	1	3	43	57	57	30	—	5	0	0	0
Utah <sup>1</sup> .....	0	2	0	—	—	1	1	9	6	0	0	0
Nevada.....	0	0	0	—	—	—	1	—	—	0	0	0
PACIFIC												
Washington.....	4	6	6	—	—	—	33	128	28	2	2	2
Oregon.....	1	6	6	13	3	9	8	15	23	2	0	1
California.....	19	42	33	12	23	23	60	191	128	7	8	8
Total.....	401	832	596	1,410	2,371	1,417	1,120	1,406	1,406	77	97	97
48 weeks.....	12,914	13,883	11,769	201,458	82,972	91,225	645,852	108,793	551,026	5,079	7,015	7,015

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Oct. 26, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Pollomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>3</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Oct. 26, 1946	Oct. 27, 1945		Oct. 26, 1946	Oct. 27, 1945		Oct. 26, 1946	Oct. 27, 1945		Oct. 26, 1946	Oct. 27, 1945	
NEW ENGLAND												
Maine.....	5	2	0	39	30	17	0	0	0	0	4	1
New Hampshire.....	5	1	0	8	0	3	0	0	0	1	0	0
Vermont.....	5	2	1	6	7	7	0	0	0	0	0	0
Massachusetts.....	29	21	11	54	102	121	0	0	0	4	0	4
Rhode Island.....	2	0	0	3	3	4	0	0	0	0	0	0
Connecticut.....	8	8	7	21	20	21	0	0	0	0	2	1
MIDDLE ATLANTIC												
New York.....	79	48	48	107	164	168	0	0	0	5	10	8
New Jersey.....	6	26	15	47	41	48	0	0	0	1	4	4
Pennsylvania.....	15	22	16	99	144	139	0	0	0	13	6	6
EAST NORTH CENTRAL												
Ohio.....	18	29	17	173	217	204	0	0	0	4	9	4
Indiana.....	21	5	5	65	52	51	1	0	0	4	2	0
Illinois.....	96	51	27	91	138	138	0	0	1	1	3	3
Michigan <sup>1</sup> .....	48	5	8	129	112	112	0	0	0	2	0	1
Wisconsin.....	26	45	5	49	60	96	0	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota.....	45	13	13	33	19	46	0	0	0	0	1	0
Iowa.....	28	25	2	31	41	41	0	0	0	2	0	0
Missouri.....	31	14	2	21	51	34	0	2	0	3	3	2
North Dakota.....	6	0	0	7	17	9	0	1	0	0	2	0
South Dakota.....	4	0	0	7	4	17	0	0	0	0	0	1
Nebraska.....	19	2	3	17	13	13	0	0	0	0	0	0
Kansas.....	28	7	7	21	66	60	0	0	0	0	0	1
SOUTH ATLANTIC												
Delaware.....	1	3	3	6	4	4	0	0	0	1	0	1
Maryland <sup>1</sup> .....	6	0	1	10	40	35	0	0	0	0	2	2
District of Columbia.....	1	3	3	11	13	14	0	0	0	0	3	0
Virginia.....	4	9	6	40	137	77	0	0	0	1	3	3
West Virginia.....	3	1	1	74	102	63	0	0	0	2	1	1
North Carolina.....	4	4	4	34	114	113	0	0	0	2	1	2
South Carolina.....	0	2	2	1	10	12	0	0	0	1	1	1
Georgia.....	8	2	1	18	36	36	0	0	0	4	4	5
Florida.....	6	6	2	6	5	8	1	0	0	0	0	0
EAST SOUTH CENTRAL												
Kentucky.....	4	4	5	52	49	50	0	0	0	4	5	5
Tennessee.....	2	25	4	24	41	80	0	0	0	1	2	4
Alabama.....	3	3	4	24	22	36	0	0	0	0	4	4
Mississippi <sup>1</sup> .....	4	4	2	10	34	14	0	1	1	2	5	4
WEST SOUTH CENTRAL												
Arkansas.....	11	0	0	6	13	7	0	1	0	0	2	3
Louisiana.....	7	9	1	13	33	8	0	0	0	1	1	3
Oklahoma.....	5	0	1	4	25	20	0	0	0	1	0	0
Texas.....	14	17	12	26	94	57	0	0	0	5	8	10
MOUNTAIN												
Montana.....	2	5	0	6	12	18	0	0	0	0	4	0
Idaho.....	5	2	0	11	6	13	0	0	0	1	0	0
Wyoming.....	3	1	0	5	1	1	4	0	0	0	0	0
Colorado.....	13	7	2	33	19	19	0	0	0	0	2	2
New Mexico.....	3	3	1	5	14	6	0	0	0	0	1	1
Arizona.....	2	0	0	19	11	10	0	0	0	1	0	1
Utah <sup>1</sup> .....	5	6	3	9	5	8	0	0	0	0	2	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	18	6	6	45	39	38	0	0	0	1	0	1
Oregon.....	4	5	5	16	18	18	0	1	0	0	0	1
California.....	54	36	21	130	214	143	0	0	0	4	2	2
Total.....	716	489	363	1,666	2,412	2,355	6	6	7	71	105	105
43 weeks.....	22,373	11,952	11,120	96,107	148,683	113,474	306	301	648	3,535	4,271	4,327

<sup>1</sup> Period ended earlier than Saturday.

<sup>3</sup> Including paratyphoid fever reported separately as follows: Massachusetts (salmonella infection) 2; New York 2; Ohio 1; West Virginia 1; Georgia 2; Texas 3; California 2.

Telegraphic morbidity reports from State health officers for the week ended Oct. 26, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Oct. 26, 1945								
	Week ended—		Median 1940- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever en- demic	Un- du- lant fever	
	Oct. 26, 1945	Oct. 27, 1945		Ame- bic	Bacil- lary	Un- speci- fied						
NEW ENGLAND												
Maine.....	6	28	28	—	—	—	—	—	—	—	2	
New Hampshire.....	3	2	2	—	—	—	—	—	—	—	1	
Vermont.....	9	7	17	—	—	—	—	—	—	—	—	
Massachusetts.....	141	128	128	—	1	—	—	—	—	—	1	
Rhode Island.....	32	6	6	—	1	—	—	—	—	—	—	
Connecticut.....	17	27	49	1	1	—	—	—	—	—	8	
MIDDLE ATLANTIC												
New York.....	140	243	250	12	86	—	1	—	—	—	5	
New Jersey.....	118	164	164	—	—	—	—	—	—	—	2	
Pennsylvania.....	139	209	209	—	1	—	1	—	—	—	1	
EAST NORTH CENTRAL												
Ohio.....	52	164	152	5	—	2	1	—	—	—	5	
Indiana.....	17	43	16	—	—	—	—	—	—	—	3	
Illinois.....	90	96	137	7	—	—	2	—	2	—	6	
Michigan <sup>1</sup> .....	196	104	123	—	—	—	—	—	—	—	1	
Wisconsin.....	155	50	130	—	—	—	—	—	—	—	3	
WEST NORTH CENTRAL												
Minnesota.....	6	20	53	2	—	—	—	—	—	—	4	
Iowa.....	9	3	18	2	—	—	—	—	—	—	—	
Missouri.....	17	5	16	—	—	1	—	—	2	—	1	
North Dakota.....	—	1	6	—	—	—	—	—	—	—	—	
South Dakota.....	1	1	1	—	—	—	—	—	—	—	—	
Nebraska.....	2	—	9	—	—	—	—	—	—	—	—	
Kansas.....	16	17	30	1	—	—	—	—	1	—	2	
SOUTH ATLANTIC												
Delaware.....	1	1	2	—	—	—	—	—	—	—	—	
Maryland <sup>1</sup> .....	24	50	50	—	—	—	—	—	—	—	1	
District of Columbia.....	7	11	11	—	—	—	—	—	—	—	—	
Virginia.....	82	25	25	—	—	41	—	—	—	1	1	
West Virginia.....	13	7	13	—	—	—	—	—	—	—	—	
North Carolina.....	30	64	64	—	—	—	—	—	3	3	—	
South Carolina.....	8	79	32	—	5	—	—	—	—	—	—	
Georgia.....	2	27	9	—	5	—	—	—	—	12	—	
Florida.....	15	6	6	—	—	5	—	—	—	7	—	
EAST SOUTH CENTRAL												
Kentucky.....	11	45	45	—	—	—	—	—	—	—	1	
Tennessee.....	14	15	21	1	—	—	—	—	1	1	1	
Alabama.....	14	21	21	2	—	—	—	—	—	4	1	
Mississippi <sup>1</sup> .....	—	—	—	—	—	—	—	1	—	—	2	
WEST SOUTH CENTRAL												
Arkansas.....	9	3	16	—	—	—	—	—	1	—	1	
Louisiana.....	1	2	2	4	—	—	—	—	1	3	—	
Oklahoma.....	1	8	5	—	—	—	1	—	—	—	—	
Texas.....	120	99	72	8	149	21	2	—	—	21	7	
MOUNTAIN												
Montana.....	1	7	23	—	—	—	—	—	—	—	—	
Idaho.....	—	6	3	—	—	—	1	—	1	—	—	
Wyoming.....	1	2	5	—	—	—	—	—	—	—	—	
Colorado.....	18	15	16	—	1	—	1	—	—	—	2	
New Mexico.....	4	27	6	—	1	—	—	—	—	—	—	
Arizona.....	6	11	7	—	—	19	—	—	—	—	—	
Utah <sup>1</sup> .....	2	12	12	—	—	—	—	—	1	—	—	
Nevada.....	—	—	—	—	—	—	—	—	—	—	—	
PACIFIC												
Washington.....	11	38	38	—	—	—	—	—	—	—	1	
Oregon.....	8	8	8	5	—	—	—	2	—	—	—	
California.....	56	116	116	4	14	—	4	—	1	2	9	
Total.....	1,620	2,023	2,177	54	265	89	14	3	14	54	72	
Same week, 1945.....	2,023	—	—	43	380	94	10	1	5	90	101	
Average, 1942-45.....	1,915	—	—	40	420	105	9	4	7	109	—	
43 weeks: 1946.....	82,038	—	—	2,012	13,768	5,558	543	549	775	2,942	4,307	
1945.....	104,825	—	—	1,618	21,645	9,517	552	451	626	4,155	3,970	
Average, 1943-45.....	113,696	—	—	1,640	18,459	7,943	569	445	595	3,588	—	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

Ashraz: Pennsylvania, 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Oct. 19, 1946

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Erysipelas, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0		1	0	0	1	0	0	2
New Hampshire:												
Concord	0	0		0	2	0	0	1	1	0	0	
Massachusetts:												
Boston	2	0		0	10	0	7	24	6	0	0	25
Fall River	0	0		0		0	2	0	0	0	0	
Springfield	0	0		0	11	1	1	0	2	0	0	7
Worcester	0	0		0	2	0	7	9	1	0	0	9
Rhode Island:												
Providence	0	0		0	8	0	2	2	3	0	0	15
Connecticut:												
Bridgeport	0	0		0		0	0	0	0	0	0	2
Hartford	0	0		0		0	0	2	1	0	0	3
New Haven	0	0		0	9	0	0	0	4	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	2	0		1	2	0	3	0	5	0	0	7
New York	15	1	3	0	8	0	24	41	33	0	4	38
Rochester	0	0		0		0	2	1	4	0	0	
Syracuse	0	0		0		0	1	0	2	0	0	6
New Jersey:												
Camden	0	0		1		0	1	0	0	0	0	4
Newark	0	0		0	1	1	3	1	4	0	0	11
Trenton	0	0		0		0	2	0	0	0	0	
Pennsylvania:												
Philadelphia	2	0	1	1	1	1	10	2	0	0	0	21
Pittsburgh	2	0		0	30	3	13	0	6	0	0	1
Reading	0	0		0		0	2	0	0	0	0	8
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0		0		1	2	0	8	0	0	3
Cleveland	0	0	2	1	44	1	7	12	16	0	1	11
Columbus	1	0	1	1	3	0	1	0	10	0	0	2
Indiana:												
Fort Wayne	0	0		1		0	2	0	0	0	0	
Indianapolis	0	0		0	2	0	1	5	3	0	2	3
South Bend	0	0		0		0	0	1	1	0	0	
Terre Haute	0	0		0		0	3	0	0	0	0	
Illinois:												
Chicago	3	0	4	0	6	2	19	29	37	0	1	45
Springfield	0	0		0		0	3	0	1	0	0	
Michigan:												
Detroit	1	0		0	1	0	9	12	35	0	0	83
Flint	0	0		0		0	5	0	5	0	0	3
Grand Rapids	0	0		0	4	0	0	1	2	0	0	15
Wisconsin:												
Kenosha	0	0		0		0	0	1	0	0	0	
Milwaukee	0	1		0	5	1	0	3	9	0	0	87
Racine	0	0		0		0	0	1	3	0	0	
Superior	0	0		0		0	0	2	0	0	0	
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0		0	0	1	0	0	0	
Minneapolis	3	0		0		2	3	5	6	0	0	
St. Paul	1	0		0		0	4	3	5	0	0	2
Missouri:												
Kansas City	5	0		0		0	2	12	9	0	0	2
St. Joseph	0	0		0		0	0	1	0	0	0	1
St. Louis	3	0	1	0	1	2	7	21	8	0	0	3

## City reports for week ended Oct. 19, 1946—Continued

Division, State, and City	Diphtheria cases	Epidemic, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyellitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	1	0	—	0	1	0	1	13	6	0	0	—
Kansas:												
Topeka.....	0	0	—	0	1	0	0	2	2	0	0	—
Wichita.....	0	0	—	0	—	0	4	0	5	0	0	—
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	—	0	2	0	2	1	1	0	0	—
Maryland:												
Baltimore.....	2	0	—	0	1	0	6	2	4	0	1	20
Cumberland.....	0	0	—	0	4	0	0	0	0	0	0	—
Frederick.....	0	0	—	0	2	0	0	0	0	0	0	—
District of Columbia:												
Washington.....	0	0	—	0	1	1	1	1	4	0	0	7
Virginia:												
Lynchburg.....	0	0	—	0	1	0	0	0	2	0	0	—
Richmond.....	0	0	—	0	7	0	0	0	2	0	1	3
Roanoke.....	0	0	—	0	—	0	0	0	0	0	0	—
West Virginia:												
Charleston.....	0	0	—	0	—	0	0	0	2	0	0	—
Wheeling.....	0	0	—	0	1	0	1	0	0	0	0	—
North Carolina:												
Raleigh.....	0	0	—	0	—	0	1	0	0	0	0	2
Wilmington.....	0	0	—	0	—	0	2	0	0	0	0	—
Winston-Salem.....	0	0	—	0	13	0	1	0	5	0	0	5
South Carolina:												
Charleston.....	0	0	2	0	1	0	2	0	0	0	0	1
Georgia:												
Atlanta.....	0	0	3	0	—	0	3	1	3	0	2	—
Brunswick.....	0	0	—	0	—	0	1	0	0	0	0	4
Florida:												
Tampa.....	2	0	—	0	—	0	0	0	4	0	0	—
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	—	0	2	0	12	3	2	0	1	2
Nashville.....	0	0	—	0	—	0	2	0	0	0	0	—
Alabama:												
Birmingham.....	3	0	—	0	1	0	2	1	3	0	2	—
Mobile.....	3	0	—	0	—	0	0	0	2	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	—	0	—	0	2	1	0	0	0	—
Louisiana:												
New Orleans.....	2	0	—	0	—	0	3	6	0	0	1	1
Shreveport.....	0	0	—	0	—	0	4	1	0	0	0	—
Texas:												
Dallas.....	2	0	—	0	—	0	2	1	0	0	0	—
Galveston.....	0	0	—	0	—	0	1	0	0	0	1	—
Houston.....	3	0	—	0	—	0	1	1	1	0	0	1
San Antonio.....	1	0	—	1	—	1	1	3	0	0	0	—
MOUNTAIN												
Montana:												
Billings.....	0	0	—	0	—	0	2	0	0	0	0	—
Great Falls.....	0	0	—	0	4	0	0	0	0	0	0	—
Helena.....	0	0	—	0	—	0	1	0	0	0	0	—
Missoula.....	0	0	—	0	—	0	2	1	1	0	0	3
Idaho:												
Boise.....	0	0	—	0	—	0	0	0	0	0	0	—
Colorado:												
Denver.....	1	0	6	0	2	0	5	0	4	0	0	7
Pueblo.....	0	0	—	0	—	0	0	3	3	0	0	—
Utah:												
Salt Lake City.....	0	0	—	0	3	0	0	1	4	0	0	1

## City reports for week ended October 19, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, in- fectious, cases	Influenza		Measles cases	Meningitis, me- ningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	1	0	-----	0	2	0	2	2	0	0	0	2
Spokane.....	0	0	-----	0	1	0	0	3	1	0	0	2
Tacoma.....	0	0	-----	0	2	0	0	1	0	0	0	-----
California:												
Los Angeles.....	5	0	1	1	3	1	2	11	20	0	1	7
Sacramento.....	1	0	-----	0	-----	0	1	0	0	0	0	-----
San Francisco.....	0	0	-----	0	3	0	7	0	7	0	0	7
Total.....	68	2	24	8	208	19	225	252	316	0	18	496
Corresponding week, 1945.	93	-----	42	11	268	-----	274	-----	547	0	14	666
Average, 1941-45.....	86	-----	57	16	290	-----	304	-----	519	0	23	774

<sup>1</sup> 3-year average, 1943-45<sup>2</sup> 5-year median, 1941-45*Dysentery, amebic.*—Cases: Buffalo 1; New York 2; Rochester 1; St. Paul 1; St. Louis 1.*Dysentery, bacillary.*—Cases: Providence 1; New York 9; Charleston, S. C., 1; Los Angeles 3.*Dysentery, unspecified.*—Cases: Cincinnati 2; San Antonio 6.*Typhus fever, endemic.*—Cases: Charleston, S. C., 1; Atlanta 1; Tampa 1; Mobile 1; Little Rock 1; New Orleans 4; Galveston 1; Houston 1; San Antonio 1; Los Angeles 3.

## Rates (annual basis) per 100,000 population, by geographic groups for the 87 cities in the preceding table (estimated population, 1943, 34,237,200)

	Diphtheria case rates	Encephalitis, infections, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	5.3	0.0	0.0	0.0	110	5.3	49.9	99.8	50	0.0	0.0	171
Middle Atlantic.....	9.7	0.5	1.9	1.4	19.	2.3	28.2	20.8	25	0.0	1.9	44
East North Central.....	3.0	0.6	4.3	1.8	40	3.0	31.6	40.7	79	0.0	2.4	153
West North Central.....	26.1	0.0	2.0	0.0	6	8.0	42.2	116.6	74	0.0	0.0	16
South Atlantic.....	6.8	0.0	8.5	0.0	56	1.7	34.0	8.5	46	0.0	6.8	71
East South Central.....	41.3	0.0	0.0	0.0	18	0.0	84.4	23.6	41	0.0	17.7	12
West South Central.....	23.0	0.0	0.0	2.9	0	2.9	40.2	37.3	3	0.0	5.7	6
Mountain.....	7.9	0.0	47.7	0.0	71	0.0	79.4	39.7	108.	0.0	0.0	87
Pacific.....	11.1	0.0	1.6	1.6	17	1.6	19.0	26.9	44	0.0	1.6	28
Total.....	10.4	0.3	3.7	1.2	32	2.9	34.4	38.5	48	0.0	2.7	76



## TERRITORIES AND POSSESSIONS

## Panama Canal Zone

*Notifiable diseases—August 1946.*—During the month of August 1946, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox.....	3	—	1	—	1	—	2	—	7	—
Diphtheria.....	11	—	2	—	5	—	3	—	21	—
Dysentery:										
Amebic.....	2	—	—	—	—	—	1	—	3	—
Bacillary.....	4	—	1	—	—	—	5	—	10	—
Leprosy.....	—	—	—	—	—	—	1	—	—	1
Malaria <sup>1</sup> .....	8	—	2	—	47	1	52	3	109	4
Measles.....	83	11	11	—	57	—	54	1	205	12
Mumps.....	—	—	—	—	14	—	1	—	15	—
Paratyphoid fever.....	1	—	—	—	—	—	2	—	3	—
Pneumonia.....	—	21	—	2	79	—	3	—	79	26
Scarlet fever.....	—	—	—	—	1	—	—	—	1	—
Tuberculosis.....	—	18	—	4	3	3	—	6	13	31
Typhoid fever.....	1	—	—	—	—	—	1	3	2	3
Whooping cough.....	—	—	—	1	2	—	—	—	2	1

<sup>1</sup> 18 recurrent cases.

<sup>2</sup> In the Canal Zone only.

## Virgin Islands of the United States

*Notifiable diseases—July–September 1946.*—During the months of July, August, and September 1946, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	July	August	September	Disease	July	August	September
Filariasis.....	5	—	6	Schistosomiasis.....	—	1	—
Gonorrhea.....	10	15	6	Syphilis.....	15	13	12
Hookworm disease.....	—	3	3	Tetanus.....	1	—	—
Leprosy.....	—	1	—	Tuberculosis (respiratory).....	2	2	2
Lymphogranuloma venereum.....	2	—	—	Typhoid fever.....	5	2	2
Paratyphoid fever.....	—	1	1	Typhus fever (murine).....	1	—	—
Pollomyelitis.....	3	—	—				

## DEATHS DURING WEEK ENDED OCT. 19, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 19, 1946	Corresponding week, 1945
Data for 91 large cities of the United States:		
Total deaths.....	8,606	9,311
Average for 3 prior years.....	8,919	—
Total deaths, first 42 weeks of year.....	374,252	370,493
Deaths under 1 year of age.....	742	615
Average for 3 prior years.....	607	—
Deaths under 1 year of age, first 42 weeks of year.....	26,865	25,013
Data from industrial insurance companies:		
Policies in force.....	67,321,550	67,299,160
Number of death claims.....	10,263	12,623
Death claims per 1,000 policies in force, annual rate.....	7.9	9.8
Death claims per 1,000 policies, first 42 weeks of year, annual rate.....	9.5	10.1

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended October 5, 1946.*—During the week ended October 5, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		6		53	99	30	7	39	93	327
Diphtheria.....	2	2	2	38	10	8				62
Dysentery, bacillary.....					1					1
Encephalitis, infectious.....						1				1
German measles.....					6		1	3	4	14
Influenza.....					10	2				12
Measles.....		16		91	97	30	46	32	6	318
Meningitis, meningococcus.....				1	1					2
Mumps.....				26	148	33	50	30	69	356
Polomyelitis.....	7	2	6	38	26	1	1		3	84
Scarlet fever.....		14	2	66	24	17	1	8	8	140
Tuberculosis (all forms).....		1	13	121	42	38	1	31	54	301
Typhoid and paratyphoid fever.....				18	2	1		1	2	24
Undulant fever.....				2	3			2	1	8
Venereal diseases:										
Gonorrhea.....	6	17	8	67	131	58	46	43	61	437
Syphilis.....	3	9	6	111	65	14	8	13	37	265
Other forms.....				7					1	8
Whooping cough.....		12		90	56	4	20	4	1	187

### CUBA

*Habana—Communicable diseases—4 weeks ended October 12, 1946.*—During the 4 weeks ended October 12, 1946, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria.....	9		Scarlet fever.....	1	
Malaria.....	21		Tuberculosis.....	5	6
Measles.....	8		Typhoid fever.....	24	1
Polomyelitis.....	1				

*Provinces—Notifiable diseases—4 weeks ended October 5, 1946.*—During the 4 weeks ended October 5, 1946, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Río	Habana <sup>1</sup>	Matan- zas	Santa Clara	Cama- güey	Oriente	Total
Cancer.....	3	13	12	8	1	18	55
Diphtheria.....	1	13	4				17
Hookworm disease.....				3			3
Leprosy.....		3			1		4
Malaria.....	6	13			3	40	62
Measles.....	1	7	1	1	2	12	24
Polioomyelitis.....	6	4		5	2		17
Scarlet fever.....		1					1
Tuberculosis (respiratory).....	10	18	35	23	40	41	167
Typhoid fever.....	106	45	9	19	21	41	241
Whooping cough.....		1					1
Yaws.....						2	2

<sup>1</sup> Includes the city of Habana.

### JAPAN

*Notifiable diseases—4 weeks ended September 21, 1946, and year to date.*—During the 4 weeks ended September 21, 1946, and the year to date, cases of certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended Sept. 21, 1946	Total cases re- ported for the year to date	Disease	4 weeks ended Sept. 21, 1946	Total cases re- ported for the year to date
Cerebrospinal meningitis.....	92	1,203	Paratyphoid fever.....	1,307	6,900
Cholera.....	303	1,185	Scarlet fever.....	134	1,416
Diphtheria.....	2,852	34,823	Smallpox.....	13	17,555
Dysentery.....	22,895	62,638	Syphilis.....	7,525	48,503
Encephalitis, Japanese "B".....	37	1,140	Typhoid fever.....	4,782	35,453
Gonorrhea.....	12,643	88,184	Typhus fever.....	87	30,708
Malaria.....	4,835	120,245			

<sup>1</sup> For the period June 2, 1946 to date.

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

#### Cholera

*China.*—Cholera has been reported in certain provinces of China as follows: Chekiang Province—August 21–31, 1946, 72 cases, 7 deaths, September 1–10, 1946, 104 cases, 3 deaths, September 11–20, 1946, 235 cases, 27 deaths; Honan Province—August 21–31, 1946, 191 cases, 21 deaths, September 1–10, 1946, 106 cases, 9 deaths; Hunan Province—September 1–10, 1946, 178 cases, 28 deaths, September 11–20, 1946, 193 cases, 32 deaths; Kwangtung Province—August 21–31, 1946, 73 cases, 26 deaths, September 1–10, 1946, 135 cases, 67 deaths.

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

THOMAS PARRAN, *Surgeon General*

**DIVISION OF PUBLIC HEALTH METHODS**

G. ST. J. FERROT, *Chief of Division*

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# Public Health Reports

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# Public Health Reports

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## RICKETTSIALPOX—A NEWLY RECOGNIZED RICKETTSIAL DISEASE

### IV. ISOLATION OF A RICKETTSIA APPARENTLY IDENTICAL WITH THE CAUSATIVE AGENT OF RICKETTSIALPOX FROM *ALLODERMANYSSUS* *SANGUINEUS*, A RODENT MITE<sup>1</sup>

By ROBERT J. HUEBNER, *Senior Assistant Surgeon*; WILLIAM L. JELLISON,  
*Parasitologist, United States Public Health Service*; and CHARLES POMERANTZ,  
*Bell Exterminating Co., New York, N. Y.*

The purpose of this paper is to report the isolation of a rickettsia from each of two pools of mites (*Allodermanyssus sanguineus* Hirst, a rodent ectoparasite<sup>2</sup>) collected in a housing development in New York, N. Y., where more than 80 cases of rickettsialpox have occurred. Evidence is presented which serves to establish the strains of rickettsia isolated from mites as identical with the M. K. strain isolated from a patient ill with rickettsialpox (1).

The presence of *A. sanguineus* in the housing development was discovered in the last week in July 1946 by one of us (C. P.). The presence of large numbers of house mice (*Mus musculus*), a concomitant infestation with a blood-sucking mite, both previously reported (2, 3), and consistent clinical and epidemiological features (4, 5) led to the establishment of a field laboratory in the involved housing develop-

<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health, Bethesda, Md., and the Rocky Mountain Laboratory of the Division of Infectious Diseases, National Institute of Health, Hamilton, Mont.

<sup>2</sup> Original specimens were identified by Dr. E. W. Baker, of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. A communication from O. F. W. Muesebeck, in charge of the Division of Insect Identification of the U. S. Department of Agriculture, described the history of the mites in this country:

*Allodermanyssus sanguineus* (Hirst) was first recorded in publication for the United States in 1923 although the first specimens to be received in this unit were collected in the District of Columbia in 1909. Between 1909 and 1938 only one additional record of the occurrence of this mite in the United States was brought to our notice. Since 1938, however, we have received a number of samples. These have been from Tucson, Ariz., the District of Columbia, New York, N. Y. (several samples), Philadelphia, Indianapolis, and Boston. In most cases the specimens were submitted with notes indicating merely that they had been taken in houses or in apartments, but some lots were said to have been taken on man, "causing rash."



ment for the purpose of studying the mice and the mites as a possible reservoir and vector, respectively, of the disease.

Several hundred specimens of *A. sanguineus* in various stages of development and engorgement were collected. Some of the mites were found on freshly trapped house mice—in one instances 10 mites were found feeding on the rump of a young mouse. The majority of the mites, however, were found crawling on the external walls of basement incinerators. It was not unusual to collect as many as 100 mites from the walls of a single incinerator. Many of the mites were fully engorged and bright red in color at the time of collection. Typical mammalian erythrocytes were found in smears of these freshly engorged mites. No other rodents or rodent parasites were found by us at this location.

It may be noted, moreover, that in two widely separated apartment developments in New York where cases of rickettsialpox have occurred, a careful search has established the presence of large numbers of mice and mites (*A. sanguineus*).

One of us (W. L. J.) developed a typical clinical attack of rickettsialpox three weeks after engaging in the work of collecting and processing large numbers of mites. He was not aware of being bitten until he observed the initial lesion 7 days before the onset of fever.

#### MATERIALS AND METHODS

Mites found on walls or in mouse nests were drawn into vials by the use of several types of suction apparatus. Large numbers of mites could thus be collected in a few minutes. In the field laboratory the engorged and the flat mites were separated and representative samples were used for mounting and identification.

The flat mites were fed on normal 1- to 10-day-old white mice and on the clipped or shaved abdomens of male guinea pigs. The period of attachment and engorgement varied from less than 15 minutes in some instances on guinea pigs to occasionally as much as 36 hours on the older mice. Most of the flat mites, when offered an opportunity, engorged promptly.

The freshly engorged mites as well as those previously engorged when collected were put into vials, labelled as to source and placed in an incubator at 30° C. After approximately 4 days of incubation, during which time many of the females were observed to deposit eggs on the side of the tube, the various pools of mites were ground in a mortar, suspended in saline and inoculated intraperitoneally into adult Swiss mice and adult male guinea pigs. Despite the fact that the mites were not washed with a bactericidal solution, no evidence of contaminating bacterial infection was encountered in many such inoculations.

## ISOLATION OF MITE STRAIN NO. 1

On September 12, 1946, a number of mites were collected from the walls of the basement incinerator servicing the apartment of M. K. from whose blood the M. K. strain of rickettsialpox had been previously isolated (1). Five subsequent cases of rickettsialpox have been successively reported from the apartments serviced by this incinerator, the most recent being that of E. K. (a sister of M. K.), who became ill on September 3, 1946.

Four days after engorging on a normal young white mouse, six of the afore-mentioned mites were inoculated into the peritoneal cavity of an adult male guinea pig. On the fourth day after inoculation an indurated skin lesion at the site of inoculation, redness, swelling of the scrotum and a temperature of 40.8° C. were noted. On the following day, the signs of disease having persisted, the animal was sacrificed. Autopsy revealed a peritoneal cavity free from exudate, a moderately enlarged spleen, and a marked periorchitis. The pulmonary and gastrointestinal systems were normal. Tunica washings and blood were used for passage into guinea pigs, white mice, and the yolk sacs of fertile eggs that had been incubated for 6 days. Heart blood failed to produce signs of disease in any of the animals inoculated.

Four days after inoculation with tunica washings, four guinea pigs responded with scrotal reaction and fever. The scrotal reaction was marked and persistent but in no case progressed to necrosis; the fever was intermittent and ephemeral.

Seven days after inoculation with tunica washings, four mice showed ruffled fur, inactivity, and rapid breathing. Two mice died on the eighth day but were not autopsied. Two mice were living 20 days after inoculation.

On the seventh day after yolk-sac inoculation of tunica washings, two of six chick embryos were dead. Yolk-sac films from the two dead embryos (stained by Machiavello's method) showed numerous intracellular and extracellular red diplobacilli morphologically similar to the rickettsiae. On the following day the remaining four eggs were found to be exceedingly rich in organisms resembling in morphology the rickettsiae of rickettsialpox (1).

An ether-extracted antigen (6) was tested in the complement-fixation test (7) with convalescent-guinea-pig serums representing the following diseases: rickettsialpox (M. K. strain), Rocky Mountain spotted fever, Q fever, and endemic typhus. Serum from M. K., a rickettsialpox patient, and normal human serum were included in the test. The behavior pattern shown by the antigen of mite strain No. 1 (table 1) was identical with that shown by the similarly prepared M. K. antigens.

TABLE 1.—*Comparative reactions of antigens prepared from yolk sacs infected with two mite strains and the M. K. strain of rickettsialpox (antigen titration)*

Antigen	Serum used in 1:16 dilution	Results with various antigen dilutions							Results with antigen-control dilutions	
		1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:2	1:4
Mite strain No. 1	Normal human	0	0	0	0	0	0	0	0	0
	Endemic typhus	0	0	0	0	0	0	0	0	0
	Q fever	0	0	0	0	0	0	0	0	0
	Rocky Mt. spotted fever	4	4	4	4	4	1	0	0	0
	M. K. guinea pig	4	4	4	4	4	3	0	0	0
Mite strain No. 2	M. K. human	4	4	4	4	4	0	0	0	0
	Normal human	0	0	0	0	0	0	0	0	0
	Endemic typhus	0	0	0	0	0	0	0	0	0
	Q fever	0	0	0	0	0	0	0	0	0
	Rocky Mt. spotted fever	4	3	( <sup>1</sup> )	0	0	0	0	0	0
M. K. strain	M. K. guinea pig	4	4	1	0	0	0	0	0	0
	M. K. human	4	2	1	0	0	0	0	0	0
	Normal human	0	0	0	0	0	0	0	0	0
	Endemic typhus	0	0	0	0	0	0	0	0	0
	Q fever	0	0	0	0	0	0	0	0	0
M. K. strain	Rocky Mt. spotted fever	4	4	4	4	4	0	0	0	0
	M. K. guinea pig	4	4	4	4	4	3	0	0	0
	M. K. human	4	4	4	4	( <sup>1</sup> )	0	0	0	0

<sup>1</sup> Transient.

To examine further the relationships of mite strain No. 1 and the M. K. strain, convalescent-guinea-pig serums from each strain were tested with several antigens—M. K. No. 4, mite No. 1, R162 (a Rocky-Mountain-spotted-fever antigen) and a Q-fever antigen. The results shown on table 2 clearly indicate the close relationship of the two strains.

TABLE 2.—*Serum titers on guinea pigs convalescent from various rickettsial diseases—complement-fixation results with four antigens*

Guinea pig sera	Antigens used in constant dilution			
	Mite No. 1	M. K.	Rocky Mt. spotted fever	Q fever
Mite strain No. 1	1:128	1:128	1:8 (2+)	0
M. K. strain of rickettsialpox	1:64	1:64	1:16	0
Rocky Mt. spotted fever	1:64	1:32	1:128	0
Q fever	0	0	0	1:512
Normal	0	0	0	0

Cross-protection studies show thus far that guinea pigs convalescent from the M. K. strain are solidly immune to mite strain No. 1. The converse experiment has not been completed.

## ISOLATION OF MITE STRAIN NO. 2

A group of approximately 10 to 14 flat mites collected from several basement incinerator walls were permitted to engorge on a mouse 3 to 4 days old. After feeding overnight the mites were removed

and used for other purposes. The mouse was returned to its mother. Ten days later the experimental mouse appeared disinterested in nursing and was less active than its litter mates. The following day the mouse was obviously ill, inactivity, rapid breathing and ruffled fur being the most apparent signs. At this time the brain was removed and a saline suspension was injected into four fertile eggs. Seven days after inoculation all the embryos were dead—three showing numerous rickettsiae on films of the yolk sacs. When tested on blood agar, both the original brain inoculum and the chick-embryo fluids were sterile. Antigens prepared from these yolk sacs and tested in the complement-fixation test gave a reaction pattern typical of the M. K. and mite No. 1 antigens (table 1). A viable yolk-sac suspension injected into the peritoneal cavity of guinea pigs produced signs typical of rickettsialpox.

Four additional strains which produced typical disease in guinea pigs have been isolated from mites. Yolk-sac cultivation, however, has so far been unsuccessful. Two of these strains were established with pools of mites which were found engorged in nature and were inoculated into the peritoneal cavities of guinea pigs without further feeding.

Guinea pigs used for feeding mites have not as yet shown definite signs of disease. One guinea pig, however, developed a vesiculopapular lesion at the site where a mite was permitted to engorge 8 days previously.

#### SUMMARY

The recovery of a rickettsia (mite strain No. 1) from a saline suspension of the tissues of mites (*Allodermanyssus sanguineus*) has been described. A rickettsia (mite strain No. 2), which is morphologically, culturally, and serologically indistinguishable from mite strain No. 1, has been isolated from a mouse "bitten" by *A. sanguineus*.

The behavior of the two mite strains in producing disease in guinea pigs, mice, and chick embryos, and as antigens in the complement-fixation test would seem to establish them as identical with the M. K. strain of rickettsialpox. Further evidence of this identity has been provided by the solid immunity afforded guinea pigs by rickettsialpox against one of the mite strains.

The recovery of apparently identical strains of rickettsia from a man ill with rickettsialpox and from bloodsucking mites collected from the domicile of the same man indicates that human infection is acquired from the mites, probably through biting.

The isolation of this agent from mites has established further its characteristics as a micro-organism of the rickettsial group. The name *Rickettsia akari* (GREEK, mite) is proposed.

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## THE PURIFICATION AND CONCENTRATION OF INFLUENZA VIRUS BY MEANS OF ALCOHOL PRECIPITATION<sup>1</sup>

By HERALD R. COX, JAMES VAN DER SCHEER, STEWART AISTON, and  
EMIL BOHNEL

The widespread use of the chick embryo for the cultivation of viruses and the markedly increased use of antigenic materials from this source for human vaccination make it desirable that influenza virus obtained from chick embryos be highly refined in order to eliminate or reduce the possibilities of sensitizing human beings to chick-embryo proteins. Of the various methods that have been devised to concentrate influenza virus so as to secure a more potent preparation for use as an immunizing vaccine, the one developed by Stanley (1, 2) and by Taylor et al. (3), in which the Sharples Laboratory's Super-Centrifuge is used, appears to be the method of choice for obtaining concentrated and purified preparations relatively free from large amounts of inactive nonviral protein.

However, the Sharples centrifuge method cannot be considered ideal for the production of influenza vaccines on a large scale since a single machine operating under optimal conditions can handle the relatively low volume of only 1.5 to 2.0 liters of infected chorio-allantoic fluid per hour. Furthermore, these machines are subject to frequent mechanical breakdowns when they are maintained in continuous operation.

With these facts in mind, efforts were made to develop a procedure that would retain the desirable features of the Sharples centrifuge

<sup>1</sup> From the Section of Viral and Rickettsial Research, Lederle Laboratories Division, American Cyanamid Company, Pearl River, New York.

method and, in addition, possess the essential property of being readily adaptable to large-scale production.

In experiments to be reported in detail elsewhere, it was found that ethyl or methyl alcohol could be used to concentrate and partially purify the PR-8, Weiss, and Lee strains of influenza virus under carefully controlled conditions of alcohol concentration, temperature, and pH. Methyl alcohol was found to be superior to ethyl alcohol since its optimal concentration was of broader range and since it caused less denaturation of virus protein. Precipitation with methyl alcohol under carefully controlled conditions produced no virus denaturation or loss of activity, as judged by chick-cell agglutinating (CCA) activity, infectivity titers in chick embryos, or immunizing potency of killed vaccines for mice. The method of methyl alcohol precipitation is readily applicable to the concentration and purification of influenza virus, using either the bucket, angle-head, or Sharples continuous-flow types of centrifuges. The method is particularly valuable from the standpoint of producing vaccines on a large scale since it may be combined readily with the Sharples centrifuge method and thus effect great savings in man- and machine-hours. Preliminary experiments also show that the method of methyl-alcohol precipitation may have wide application in the concentration and purification of other viral and rickettsial agents.

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## THE EFFECT OF TOPICALLY APPLIED SODIUM FLUORIDE ON DENTAL CARIES EXPERIENCE

### III. REPORT OF FINDINGS FOR THE THIRD STUDY YEAR<sup>1,2</sup>

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In 1942 examinations were made to determine the dental caries experience in the permanent teeth of two groups of Minnesota school children who had been selected for participation in a topical fluoride

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<sup>2</sup> The Council on Dental Therapeutics of the American Dental Association and the American College of Dentists furnished grants which were used to defray part of the expenses of this investigation.

study. The 337 children in the first of these groups then received 7 to 15 topical applications of 2-percent sodium fluoride solution to the teeth in the upper and lower left quadrants of the mouth. The second group, consisting of 392 control children, did not receive any applications. Subsequent to 1942, annual examinations of the teeth of both groups of children were made and the dental caries experience was recorded. At the end of the first and second study years, the incidence of dental caries in the fluoride-treated as compared with that of the untreated permanent teeth of the treated group of children was reported (1, 2). The incidence of caries in the teeth of treated and control groups was compared also. During the 3-year period since the beginning of the study, the number of children included in the original group who were available for reexamination has declined. At the conclusion of the third study year, only 242 children of the original treated group were available for reexamination.

At the end of the first year it was reported that the number of previously undecayed teeth attacked by caries during that study period was 39.8 percent less in fluoride-treated than in untreated teeth, and the number of additional tooth surfaces attacked in previously decayed teeth was 12.4 percent less in treated than in untreated carious teeth. Analysis of the data at the end of the second year revealed that initial caries attack on fluoride-treated teeth continued to be approximately 40 percent less than on untreated teeth. Moreover, the number of additional tooth surfaces attacked in previously decayed teeth not only continued to be less than in untreated carious teeth, but the magnitude of the difference had increased to 23.1 percent.

It is the purpose of this report to present data on the dental caries experience in the permanent teeth of the treated group of children for the 3-year period ending May 1945, and for the third study year. In summary, the data indicate that the number of teeth initially attacked by caries during the 3-year study period was 36.7 percent less in treated than in untreated teeth. Furthermore, the number of additional tooth surfaces attacked in teeth which were carious at the time of treatment was 23.9 percent less in treated than in untreated carious teeth.

#### MATERIAL AND METHODS

Three small urban communities in Minnesota—Arlington, North Mankato and St. Louis Park—provided the school populations from which the children participating in this study were selected. When the study was begun, the children ranged in age from 7 to 15 years. The treated group consisted originally of 337 children, and the control group included 392 children. The former group received applications

of sodium fluoride to the teeth in the upper and lower left quadrants of the mouth, the teeth in the upper and lower right quadrants serving as controls. The control group of children did not receive fluoride treatments.

During an 8-week period in April and May 1942, each child in the study groups was given a dental prophylaxis and a detailed dental examination. In addition, the children in the treated group received 7 to 15 topical applications of fluoride to the teeth in the left quadrants of the mouth. The fluoride-treatment procedure consisted of isolating the teeth with cotton rolls, drying the teeth with compressed air, and wetting the crown surfaces of the teeth with a 2-percent sodium fluoride solution. The applied solution was allowed to dry in air for approximately 4 minutes. During the 8-week treatment period, roughly two-thirds of the children in the treated group received 2 fluoride applications weekly to a maximum of 15, and the remaining one-third received 1 application weekly to a maximum of 8 treatments.

The fluoride treatments were completed in May 1942. The first and all subsequent dental examinations were made at yearly intervals by the same examiner. The treated and control children in any one school were examined at random. The decline which has occurred in the numbers of children in each study group since 1942 has been due to changes in residence, absence from school at the time reexaminations were conducted, or withdrawal from school. Throughout the analysis consideration is confined to the dental caries experience in the erupted permanent teeth present at the beginning of the study. The analysis prepared for the first year is based on 289 children in the treated group and 326 in the control group, and that for the second year is based on 270 treated and 320 control children. The report for the third year is based on 242 treated cases only. Previous data on the control group of children have demonstrated adequately that the occurrence of caries was bilaterally equal and at approximately the same rate as in the untreated teeth of the treated group of children. Therefore, a continuation of reports of findings in the control group does not seem warranted.

#### FINDINGS

The caries experience in the permanent teeth of the treated group of children for the 3-year period ending May 1945, is presented, by mouth quadrants, in table 1. Caries experience is expressed in terms of numbers of teeth and tooth surfaces initially attacked during this time period and additional tooth surfaces attacked in teeth that were carious in April 1942. The data on caries experience are limited to



those permanent teeth present in the mouths in 1942 when the initial dental examinations were made.

TABLE 1.—*Treated group. Dental caries experience during the 3-year period ending May 1945, for the permanent teeth in the fluoride-treated and untreated quadrants of the mouths of 242 Minnesota children*

Quadrant	Number of noncarious teeth (April 1942)	New DF <sup>1</sup> teeth (May 1945)	DF <sup>1</sup> surfaces in new DF teeth	New DF <sup>1</sup> surfaces in previously carious teeth	Total new DF <sup>1</sup> surfaces
<b>UPPER</b>					
Treated (left).....	838	130	167	107	274
Untreated (right).....	842	205	282	149	431
<b>LOWER</b>					
Treated (left).....	1,032	84	120	109	229
Untreated (right).....	1,046	133	182	135	317

<sup>1</sup> DF=carious (decayed or filled).

According to data presented in table 1, 130 sound teeth became carious in the upper left or fluoride-treated quadrant as compared with 205 in the upper right or untreated quadrant. In the lower mouth quadrants, 84 became carious in the left or treated quadrant and 133 in the right or untreated quadrant. In the treated quadrants the total number of newly carious teeth was 214, as compared with 338 in the untreated quadrants. Thus, there were 36.7 percent less previously sound teeth attacked by caries in the fluoride-treated than in the untreated teeth, during the 3-year period ending May 1945. This difference is only slightly less in magnitude than the difference of 39.8 percent observed 1 year after treatment and the difference of 41.4 percent noted 2 years following treatment. Comparison of the number of tooth surfaces subsequently attacked by caries, in teeth which were noncarious at the time of treatment, shows results in close accord with the findings reported above. During the 3-year period there were 287 surfaces involved in newly carious teeth in treated mouth quadrants as compared with 464 surfaces in such teeth in untreated quadrants, a difference of 38.1 percent.

The number of additional tooth surfaces attacked by caries in previously carious teeth was also considerably less in treated than in untreated mouth quadrants. In the upper quadrants there were 107 newly carious surfaces in teeth that had been carious at the time of treatment as compared with 149 newly carious tooth surfaces in untreated teeth. In the lower quadrants there were 109 newly carious tooth surfaces in the previously carious teeth of treated quadrants as compared with 135 newly carious surfaces in untreated quadrants.

Thus, there were 23.9 percent less newly carious surfaces in previously decayed teeth which had been treated with topical fluoride than in untreated carious teeth.

Data on caries experience for the year ending May 1945 are presented in table 2. These data are concerned only with teeth and tooth surfaces which were noncarious in May 1944 and those attacked by caries during the ensuing year. In the upper left or treated mouth quadrant, 41 teeth became carious during the year as compared with 53 teeth in the upper right or untreated quadrant, a difference of 22.6 percent. In the lower quadrants, 29 teeth became carious during the year on the left or treated side of the mouth, as compared with 37 on the right or untreated side of the mouth, a difference of 21.6 percent. The gross difference for upper and lower quadrants is 22.2 percent. This difference is appreciably lower than the differences observed for the first and for the second study years. However, the actual lessening, if any, of the caries-inhibiting effect of the topical fluoride treatments during the third year of a follow-up cannot be determined from an analysis of these data. Comparison of the caries experience in the fluoride-treated and untreated teeth by separate years becomes progressively less valid as elapsed time after treatment increases, because of two basic factors. First, the difference in the number of treated and untreated noncarious teeth available for attack becomes greater as time after treatment increases. Second, marked differences in the susceptibility to caries of the several morphological types of teeth, and the early attack of the more susceptible teeth, in greater numbers among untreated than treated teeth, decreases the comparability of the rates at which remaining

TABLE 2.—*Treated group. Dental caries experience during the year ending May 1945, for the permanent teeth in the fluoride-treated and untreated quadrants of the mouths of 233 Minnesota children*

Quadrant	Number of noncarious teeth (May 1944)	New DF <sup>1</sup> teeth (May 1945)	DF <sup>1</sup> sur- faces in new DF teeth	New DF <sup>1</sup> surfaces in previously carious teeth	Total new DF <sup>1</sup> sur- faces
<b>UPPER</b>					
Treated (left)-----	712	41	48	43	91
Untreated (right)-----	659	53	74	68	142
<b>LOWER</b>					
Treated (left)-----	940	29	39	38	77
Untreated (right)-----	911	37	45	53	98

<sup>1</sup> DF=carious (decayed or filled).

Annual rates for new carious lesions and fillings provide another index of dental need. In Hagerstown, Md., Klein and Palmer (2) found that among the school children between 6 and 15 years of age an average of 1.3 permanent tooth surfaces were attacked by caries each year. More than four-fifths of these defective surfaces received no care. According to a more recent report by Klein (3), only about 40 percent of the estimated yearly increment of 144,000,000 dental services needed by the adult white population are received. Besides this annual increment of need there is a tremendous accumulation resulting from previous neglect. It has been estimated that for each child 6 to 15 years of age, 7.5 tooth surfaces require fillings (2). In addition, the findings of Walls, Lewis, and Dollar (4) indicate an average of more than four fillings and two extractions per adult, which, together with crowns, bridges, dentures, gum treatments, prophylaxes, and other services needed, represent an approximate backlog for the general population of more than 1,000,000,000 additional services (5).

With present limited knowledge of the causes of dental caries, reliance for prevention of further decay and tooth loss rests upon early detection and repair of defective tooth surfaces (6). Yet, according to Klein (7), care for the yearly number of caries occurring in the total population probably would require double the present volume of dentist manpower. Furthermore, the previously estimated backlog represents approximately 800,000,000 hours of dentist time. At an annual rate of 1,800 man-hours per dentist (2) this is equivalent to the total professional time of 74,000 additional dentists over a period of 6 years. These figures point to a great lack of dentists. This deficiency, however, as is well known, is more acute in some sections of the country than in others.

The authors will present comparative dentist-population ratios in selected years for States and counties with different characteristics to show the prewar distribution of dentists and to aid in determining the factors which influence their location, the types of areas where deficiencies are greatest, and trends in distribution over the prewar decade. Comparable data are not available which would portray the current situation; however, it is reasonable to assume that the postwar distribution pattern will show a somewhat exaggerated effect of the forces that determined previous trends.

Comparison of dentist-population ratios based on data released by the Bureau of the Census (8) indicates a steady increase in the ratio of dentists to population from 1870 to 1930 (table 1). In addition, higher educational requirements, advanced techniques in dentistry and dental surgery, improved equipment, and trained dental assistants make possible a greater quantity and higher quality of dental

service than has been possible heretofore. In 1940, however, there were only 70,601 dentists or 53.6 per 100,000 population. This was about 4 less to serve each 100,000 individuals than had obtained a decade earlier. The small decline in the number of dentists is not as significant in itself, however, as is the fact that the steadily increasing trend in the dentist-population ratio which prevailed up to 1930 was reversed during the last decade.

TABLE 1.—*Population, number of dentists gainfully employed, and dentists per 100,000 population for each census year from 1870 to 1940*<sup>1</sup>

Year	Population	Dentists	
		Number	Per 100,000 population
1940.....	131,669,275	70,601	53.6
1930.....	122,775,046	71,055	57.9
1920.....	105,710,620	56,152	53.1
1910.....	91,972,266	39,997	43.5
1900.....	75,994,575	29,665	39.0
1890.....	62,947,714	17,498	27.8
1880.....	50,155,783	12,314	24.6
1870.....	38,558,371	7,988	20.7

<sup>1</sup> Sixteenth Census of the United States, 1940: Population, First Series, Number of Inhabitants, United States Summary; and Comparative Occupation Statistics for the United States, 1870 to 1940, Bureau of the Census.

Geographic grouping of the States calls attention to the magnitude of differences among various sections of the country (fig. 1). For example, in the Southern States<sup>2</sup> in 1940 there were only 28 dentists for each 100,000 persons; corresponding ratios for the Central, Northeastern, and Western States were 62, 66, and 68, respectively. Whereas a decrease between 1930 and 1940 of 3 to 4 dentists per 100,000 population characterized the country as a whole, in the Western States the difference averaged 14 per 100,000. This variation may be attributed to a greater expansion in the population of the West than occurred in other sections without proportionate increases in the number of dentists.

The range of the dentist-population ratios in 1940 was of course much greater for individual States than for broad geographic areas. Of the 17 States with less than 40 dentists per 100,000 population, however, 14 are in the South. Three States, Arkansas, Mississippi, and South Carolina, had less than 20 dentists per 100,000, while at

<sup>2</sup> The four geographic areas referred to in figure 1 were composed by grouping the States as follows:

Northeastern: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

Southern: Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

Western: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, and California.

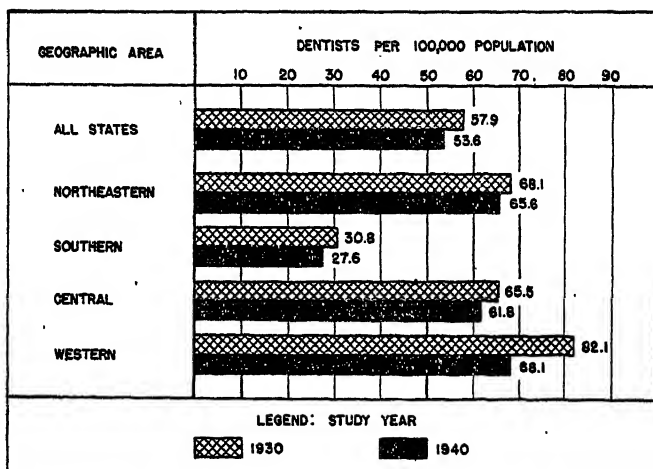


FIGURE 1.—Number of dentists per 100,000 population in each geographic area in 1930 and in 1940 based on data from the Bureau of the Census.

the other end of the scale California had 79, and Oregon, New York, and Illinois each had more than 75 dentists per 100,000 population.

O'Rourke (9) found that the high Negro population and low per capita income in the South Atlantic, East South Central, and West South Central geographic divisions apparently influence dentist-population ratios. He further points out that while these sections average from 11,000 to 18,000 Negroes for each Negro dentist, the ratio of white population to white dentists is also less favorable in these States than is true in other parts of the country. Although, to a limited extent, white and Negro dentists each serve both races (9, 10), it would seem necessary to emphasize the training of both white and Negro dentists to meet the large needs in these areas. A total of more than 13,000 additional dentists, white and Negro, would be required to bring the dentist-population ratio in Southern States up to that for the next lowest geographic group.

Another consideration in any study of the distribution of dentists is the amount of service represented. Age composition of the dentist population is the most readily available and commonly used index of service capacity. Pennell (11) based his formulas for estimating physician resources upon this factor. Studies made of the patient load of dentists during the war (12), indicate that those under 40 years of age are able to increase their hours of work under pressure to a greater extent than can the older dentists. Klein (7) considered only dentists under 65 years of age in estimating the number of active dentists required. The Procurement and Assignment Service sought dentists under 45 years of age for military service, while those selected for combat areas were usually much younger. Figure 2 shows, how-

ever, increasing proportions of dentists in the older age brackets. For instance, in 1930 more than one-third of the male dentists in practice were under 35 years of age; in 1940 less than one-fourth were below that age. The reduction in the proportion of young dentists reflects a marked decline in the enrollment of dental schools which began after 1925 and continued with some fluctuation through 1939. Only 8 percent of the male dentists were as much as 60 years of age in 1930, while a decade later 15 percent were in that category. The modal-age class in 1930 was 30-34; in 1940, 40-44. Similarly, over this period, the median age of male dentists increased from 39.4 to 43.5 years.

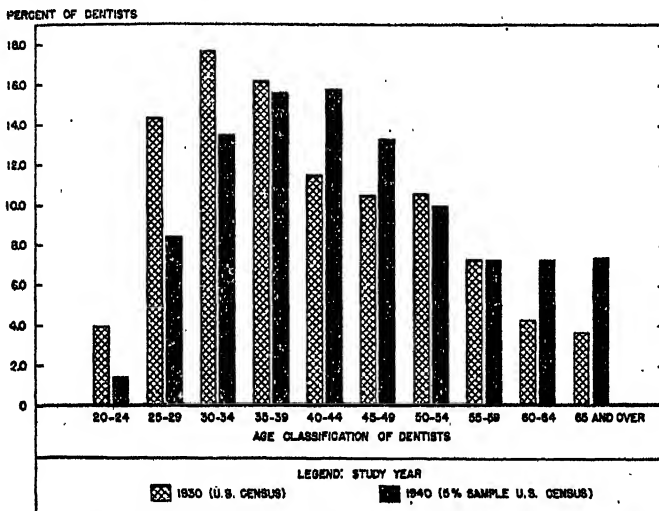


FIGURE 2.—Percentage of male dentists in selected age groups, 1930 and 1940.

A more localized picture than that afforded by State averages is desirable in studying the characteristics of places where dentists serve in greater or lesser numbers. The Bureau of the Census, however, releases no counts of dentists for political subdivisions other than States and large cities. For this reason, the authors used data from other sources for investigating dentist-population ratios in counties with different characteristics. Totals by county for 1941 were secured for 44 States from releases by the Committee on Dental Economics of the American Dental Association (13).<sup>3</sup> National totals, where needed in the comparisons, were projected from the figures covering these States on the assumption that the relationship between the 1941 national total and the total for the 44 States would be the same as that which obtained in 1940 according to the United

<sup>3</sup> Data presented by the committee (13) are in general based on the 1941 State dental registration lists. For two States, however, it was necessary to use 1940 and 1942 lists, respectively.

States Census Bureau figure. For the purpose of studying trends for different types of counties over a period of years, totals were summated for each county from listings of dentists published in Polk's 1928 Dental Register and Directory (14).

Buying power of the population in a locality is usually considered an element in determining effective demand for professional service. Counties were grouped according to their per capita <sup>4</sup> income in 1940 and appropriate dentist and population totals were combined, respectively, to show the influence of this factor upon the location of dentist personnel as well as to depict any trend between 1928 and 1941. In general, counties with the lower per capita income classifications had fewer dentists per unit of population in both years than had those counties in progressively higher per capita income brackets (fig. 3). For example, in the 107 counties of the lowest income class,

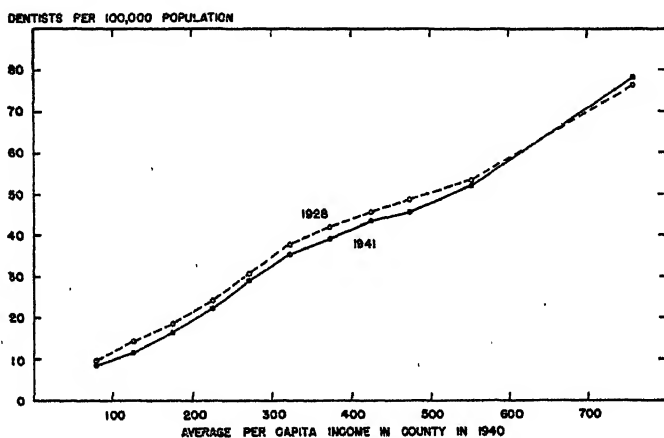


FIGURE 3.—Dentists per 100,000 population, 1928 and 1941, in counties grouped according to the average per capita income in 1940.

there were less than 10 dentists per 100,000 population in 1928; in 1941 this ratio had declined to 8. On the other hand, in counties where the average per capita income was \$600 or more, the number of dentists per 100,000 population increased from 76 in 1928 to 78 in 1941. Only counties within this per capita income classification showed a higher ratio of dentists to population in the later than in the earlier year. In each of the two years approximately one-half of the population resided in counties where the average per capita income in 1940 was \$600 or more, whereas the dentists in such areas represented two-thirds of the national total.

Location of dentists in counties appears to be affected also by con-

<sup>4</sup> The 1940 per capita income figure which was used for classifying counties was obtained by dividing the effective buying income reported for the county in the April 10, 1941 issue of Sales Management by its population as revealed in the 1940 U. S. census reports.

centration of population in urban locations. Both in 1928 and in 1941, the ratios of dentists to population were greater in those counties which in 1940 had large urban places within their borders than were the ratios for counties which were entirely rural or whose urban development was limited to relatively small population centers. In 1941 the dentist-population ratio was 24 for counties without places classified as urban in the 1940 United States census, while for those containing the largest cities it was 4 times as high (fig. 4). Comparison of ratios for the 2 years indicates that trends, if any, which occurred over the period accounted for only minor changes in ratios for counties in any given group. There was a very slight decrease in the relative number of dentists resident in counties without urban places or in those containing small cities of less than 10,000 persons. Ratios for counties in which there were cities of between 10,000 and 250,000 population showed little change over the period, while those counties with cities of from 250,000 to 499,999 evidenced some decline. Where cities of 500,000 or more were found, however, the dentist-population ratios increased.

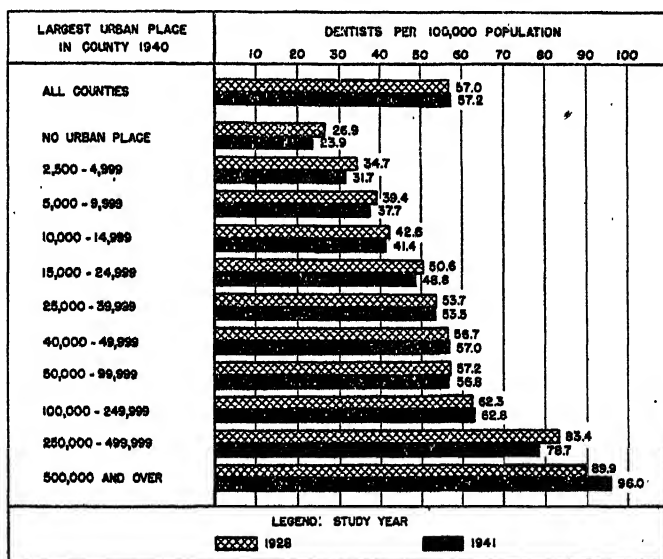


FIGURE 4.—Dentists per 100,000 population, 1928 and 1941, in counties grouped according to size of the largest urban place in 1940.

Dentists were located in 40 more counties in 1941 than in 1928.<sup>5</sup> Added to such factors as improved roads and better transportation facilities, this may denote some progress in the distribution of dental services. There remained in 1941, however, about 215 counties with

<sup>5</sup> This comparison excludes counties in the States of South Carolina, Washington, and West Virginia for which comparable county data are not available.



no dentists (15). For the majority of the counties without dentists, the average 1940 per capita income was less than \$200, and in less than one percent of the counties without dentists was there an incorporated place with a population as great as 2,500 inhabitants. These counties averaged only 5 persons per square mile, and were concentrated in a few States. For example, of Georgia's 159 counties, 36, comprising 9 percent of the State's population, were without a dentist. Likewise, no dentists were listed for 34 counties in Texas, 12 counties each in Virginia and Colorado, 11 in South Dakota, and 10 counties each in Montana and Tennessee. Since some dentists, particularly in the South, travel from place to place, the absence of practicing or resident dentists in these counties does not necessarily imply a total lack of care for all of the population. It does signify, however, that for many persons in these counties dental service can be had only by traveling a considerable distance.

Camalier and Altman (16, 17) found in studying the postwar plans of dental officers in the armed forces that there seemed to be a trend among new practitioners toward medium-sized cities rather than to large cities or rural communities. Moreover, they observed that "among former practitioners who are considering a change of community, the trend is away from communities of less than 5,000 persons, and, though to a lesser extent, away from cities of 100,000 population or more." They pointed out that the prewar shortages in rural areas will be intensified by the tendency of returning dental officers to locate in cities of between 5,000 and 100,000 population. Such a pattern was noted by Mountin and others (18) in studying location changes made by migrating physicians between 1923 and 1938.

Statistics presented in the preceding pages demonstrate that dentists were not distributed in proportion to the population before the war; rather they were concentrated in areas of high per capita income and in large urban communities. Changes which occurred in the decade of 1930 to 1940, as well as the plans of dentists in the armed services, also indicate that the trend is away from low-income and rural areas. Thus, unless steps are taken to make such areas more attractive as places to practice, these inequalities in the availability of dentists will continue and may be even further accentuated. At the same time, other factors such as greater appreciation of dental service and improved standards of living are operating to increase demands for dental service, thus making shortages of dentists more acutely felt in many areas.

Any estimates of personnel shortages imply the assumption of some measure of adequacy for application to population groups to determine minimum needs. As a first approach to this problem the authors have considered the 1941 ratio of dentists to

population which prevailed in the five contiguous States of Connecticut, Massachusetts, Rhode Island, New Jersey, and New York as a possible minimum standard for estimating the need for dentists in the country as a whole. These States, which have a relatively high per capita income and in general represent a heavily populated industrial area, average 76 dentists per 100,000 population. While the sufficiency of this ratio cannot be established on the basis of data at hand, it at least represents a figure which had actually been attained under the prevailing scheme of dental practice prior to the onset of World War II. Application of this ratio to the combined population of the country reveals a total requirement of about 110,000 dentists, or nearly 34,000 more than were registered in 1941. Accumulation of the differences between existing dentists and those needed, on the basis of this standard, shows an excess of approximately 7,000 dentists in the wealthy and more densely populated counties. If it can be assumed that these dentists might be willing to move to areas of scarcity, 27,000 new practitioners would still be required to provide all counties with 76 dentists per 100,000 population.

Many people, however, within the five States which furnish the basis for the foregoing estimate lack sufficient dental care. Some higher standard should, therefore, be investigated. Various estimates by competent persons in the field suggest that at least 100 dentists for each 100,000 persons would be necessary to serve adequately a population which had been receiving good care. Klein's calculations (7), presented earlier in this paper indicated that care of the yearly incidence of dental need would require about twice the dental manpower available in 1940, or 130,000 dentists under 65 years of age. Dollar (19) estimated the number needed for an adequate maintenance program at 135,000. Earlier, in a study of the essentials of good medical care and the services involved, Lee and Jones (20) calculated, in various combinations, the number of dentists and auxiliary personnel required by a population which had been receiving adequate dental service. Of these estimates, the one providing the largest proportion of auxiliary personnel called for 98.6 dentists per 100,000 population. These estimates do not make allowance for the care of the tremendous backlog of dental defects that now exists;<sup>6</sup> yet, approximately 60,000 additional dentists would be needed to meet the suggested standard of 100 dentists to 100,000 population. Since only about a thousand dentists more

<sup>6</sup> Without changes in methods of practice, it seems doubtful that 100 dentists of any age can provide adequate maintenance care for a population of 100,000. For instance in Hagerstown, Md., in 1938, at a time when studies of the dental problems of elementary school children were made, there were 32 practicing dentists, a ratio of about 1 dentist per 1,000 population (8), yet dental caries were accruing in permanent teeth of school children approximately six times as fast they were being filled. It was estimated that "less than 2 percent of the total professional time of each dentist is devoted to the filling of permanent teeth in that 15 percent of the population which attends elementary schools."

than this minimum live in counties which now have a surplus in terms of this standard, inducing them to move to areas where the need is greater would contribute little toward supplying the 60,000 estimated as required.

The main source for obtaining additional dental manpower to meet the increasing need and demand for care is an expanded training program. The annual output of dental schools has fluctuated sharply from time to time with the raising of predental requirements, the lengthening of the course of study, and availability of funds to prospective students. Data compiled by O'Rourke and Miner (21) for early years and by the Dental Students Register published in the Journal of the American Dental Association (22) for later periods, shows that beginning in 1911 there was a gradual rise in the number of graduating dentists until a peak of approximately 3,600 was reached in 1919. In 1920 the graduation of only 900 students produced a sharp decline in the trend, which may reflect to an important extent adjustments to the lengthening of the curriculum which became effective in 1917. The number began to climb again and in 1924 reached a height of more than 3,400. Between 1925 and 1941 a downward trend was again evident, until in the latter year less than 1,600 students were graduated. Stimulated no doubt by special accelerated courses, increased purchasing power of the population, and special needs associated with war activities, the annual number of graduates after 1941 again increased so that a new peak of 3,212 was reached in 1945, the highest for any year since 1924. This increase in the number of dental graduates seems likely to be lost temporarily, since the enrollment in dental schools dropped appreciably between 1943 and 1945. Freshman enrollment as of October 1945 was 1,201 students which may be compared with a 1942 enrollment of 2,702. This, obviously, will result in a much reduced number of graduates 4 years hence. If allowances are made for the usual shrinkage in class enrollment between entrance and graduation, by 1949 the number of graduates will be smaller than for any year since 1920. Although qualified veterans will fill entering classes to capacity this year (23), return of the majority of the schools to their prewar schedules, including summer vacations, will tend to reduce the yearly output of graduates even in the next few years. Moreover, because of the increasing proportion of dentists in the older age categories (24), greater losses from the profession through retirement and death may be expected than formerly.

Since this report is confined to a comparison of dentist-population ratios and trends, no attempt will be made to discuss methods of alleviating the great need for dental graduates other than to indicate the views of some observers in the field. Full use of auxiliary workers such as hygienists and dental assistants would, quite likely, make

possible an increased volume of service in relation to the number of graduate dentists. Bunting (25), in an able discussion of the problems of postwar dentistry, stated that a large number of auxiliary aids could add to the efficiency and capacity of the private practitioners. Klein (12) found that the average dentist with one chair and one assistant serves one-third more patients than does a like dentist with no assistant. O'Rourke (26) reports that approximately half of the active dentists in the country have no office assistants. His comparison reveals that there are an average of five to six auxiliary workers for each physician and an average of only two-thirds of an aid for each dentist. Among other proposals for advancing dental health are: emphasis on children's dentistry (27, 28); dental health education (25, 29); and continuance and expansion of fundamental, clinical, and epidemiological research (7, 25).

In summary, the outstanding facts in this paper are:

1. There were relatively fewer dentists to serve the population in 1940 than in 1930.
2. Dentists are poorly distributed in relation to population. In the South the dentist-population ratio is less than half that for the section of the country with the next lowest proportion.
3. Wide disparity exists between the number of dentists available to population units of comparable size in counties with low per capita income and in those where the income is high. Similarly, dentist-population ratios in counties with large urban centers are much higher than those for counties with little or no urban development.
4. The median age of dentists advanced 4 years between 1930 and 1940. During this period the proportion of dentists under 35 years of age decreased from more than one-third to less than one-fourth of the total, while the proportion of those over 60 increased from 8 to 15 percent. This indicates a gain in the number of dentists at ages where the service potential is relatively low and a loss from age groups in which capacity to render care is greatest.
5. There were 25 percent fewer dental graduates between 1930 and 1940 than in the previous decade. Although the number increased during the war years and reached a new peak in 1945, the freshman enrollment in that year was lower than at any time since 1920.

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## CHANGES IN STATE AND TERRITORIAL HEALTH AUTHORITIES

Change No. 3 to Directory of State and Territorial Health Authorities (Supplement No. 180 to the Public Health Reports—1945 Revision)

The following changes and additions have been received since compilation of Change No. 2.<sup>1</sup> Notice of further changes should be addressed to the Records and Reports Unit, Bureau of States Services, United States Public Health Service, Washington 25, D. C.

### ALASKA TERRITORIAL DEPT. OF HEALTH | ILLINOIS STATE DEPT. OF HEALTH.

#### Local health administration:

(Delete David M. Cowgill), district health officer  
Interior Service.

#### Sanitation activities (all):

(Delete Richard S. Green), director  
Division of Sanitation and Engineering.

### ARKANSAS STATE DEPT. OF HEALTH

#### Public health education:

Roy M. Reid, acting director  
Division of Public Health Education.

#### Sanitation activities:

Milk sanitation—  
C. R. Jones, director  
Division of Dairy Products Services.

### COLORADO STATE DEPT. OF HEALTH

#### Sanitation activities:

General sanitation,  
Sanitation of hotels, camps, and bathing places, and  
Sanitation of water supplies and sewerage systems—  
Gerald E. Reipe, State sanitary engineer  
Division of Sanitary Engineering.

#### Dental services:

Leslie W. Knott, M. D., M. P. H., acting chief  
Division of Public Health Dentistry.

#### Venereal disease control:

Charles H. Miller, Jr., M. D., assistant chief, Division of Communicable Diseases  
Section of Venereal Disease Control.

#### Miscellaneous activities:

Hospital survey—  
Henrietta Herbolsheimer, M. D., chief  
Division of Maternal and Child Hygiene.  
Mobile public health unit—  
Nettie M. Dorris, M. D.  
Division of General Administration.

### IOWA STATE DEPARTMENT OF HEALTH

#### Sanitation activities (all):

Paul J. Houser, acting director  
Division of Engineering.

### KANSAS STATE DEPARTMENT OF HEALTH

#### Administration, general:

Personnel administration—  
W. W. Wilmore, personnel officer.

#### Cancer services:

Robert H. Riedel, M. D., director  
Division of Cancer Control.

<sup>1</sup> Change No. 1 appeared in PUBLIC HEALTH REPORTS, 61: 1388-1387 (Sept. 20, 1940).

Change No. 2 appeared in PUBLIC HEALTH REPORTS, 61: 1544-1547 (Oct. 25, 1946).

**Tuberculosis control:**

**Paul V. Joliet, M. D.**, director  
Division of Tuberculosis Control.

**Venereal disease control:**

(Delete **R. M. Sorensen**, Surgeon (R),  
USPHS), director  
Division of Venereal Disease Control.

**MAINE STATE DEPARTMENT OF HEALTH****Cancer control:**

**A. H. Morrell, M. D.**  
Cancer Control.

**Industrial hygiene:**

**Elmer W. Campbell, D. P. H.**, director  
Division of Sanitary Engineering.

**Public health education:**

(Delete **Miriam Campbell, C. P. H.**),  
director of public health information  
Division of Public Health Education.

**MONTANA STATE DEPT. OF HEALTH**

**B. K. Kilbourne, M. D.**, Executive  
Officer

**Administration, general:**

**B. K. Kilbourne, M. D.**, executive  
officer.

**Cancer services:**

**B. K. Kilbourne, M. D.**, acting director  
Division of Epidemiology.

**Crippled children's services:**

Maternity, infant, and child (preschool)  
health services:

**School health services:**

**R. E. Mattison, M. D.**, director  
Division of Maternal and Child  
Health.

**Dental health services:**

\_\_\_\_\_ director  
Division of Dental Hygiene.

**Local health administration:**

**B. K. Kilbourne, M. D.**, acting director  
Division of Epidemiology.

**Public health nursing:**

**Helen Murphy, R. N.**, director  
Division of Public Health Nursing.

**MINNESOTA STATE DEPT. OF HEALTH****Administration, general:**

Personnel administration—  
**Jerome W. Brower**, director  
Division of Administration.

**Communicable disease control, general:**

**Dean S. Fleming, M. D., M. P. H.**,  
director  
Division of Preventable Diseases.

**Dental services:**

**William A. Jordan, D. D. S., M. P. H.**,  
director  
Division of Dental Health.

**Public health education:**

**William Griffiths**, director  
Public Health Education Unit.

**Sanitation activities:**

General sanitation—  
(Delete **H. A. Whittaker**), director  
Division of Sanitation.

Garbage collection and disposal and  
Milk sanitation—

**F. L. Woodward**, engineer  
Division of Sanitation.

**Miscellaneous activities:**

Hospital licensing and  
Hospital and child health survey—  
**Viktor O. Wilson, M. D., M. P. H.**,  
director  
Division of Child Hygiene.  
**Ethel McClure, R. N.**, supervisor  
Division of Child Hygiene.

**NEBRASKA STATE DEPT. OF HEALTH****Administration, general:**

Accounting and financing—  
**Helen J. McAllister**, fiscal officer.  
Personnel administration—  
**Vivian E. Johnson**, clerk.

**Dental services:**

**D. M. Alderson, M. D.**, acting director  
Division of Dental Health.

**Venereal disease control:**

(Delete **W. B. Quisenberry, M. D.**,  
**M. P. H.**), director  
Division of Venereal Disease Control.

**NEW HAMPSHIRE STATE DEPARTMENT OF HEALTH****Communicable disease control, general:**

**George F. Campana, M. D., M. P. H.**,  
acting director  
Division of Communicable Disease.

**NEW MEXICO STATE DEPT. OF HEALTH****Sanitation activities:**

General sanitation,  
Rodent control and control of garbage  
collection and disposal,  
Sanitation of hotels, camps, and  
bathing places, and  
Sanitation of water supplies and sewerage  
systems—

**W. H. Booker**, director  
Division of Sanitary Engineering  
and Sanitation.

**Tuberculosis control:**

**Walter Richards, M. D.**, director  
Division of Tuberculosis Control.

**NORTH DAKOTA STATE DEPT. OF HEALTH****Sanitation activities (all):**

**J. H. Svore**, director  
Division of Sanitary Engineering.

**OKLAHOMA STATE DEPT. OF HEALTH | SOUTH DAKOTA STATE DEPT. OF HEALTH****Administration, general:**

Accounting and financing and  
Personnel administration—

**Floyd Harrington**, director of fiscal  
services.

**Communicable disease control:**

**Mark I. Shanholtz**, M. D., director  
Division of Preventable Disease.

**Industrial hygiene:**

**E. C. Warkentin**, engineer  
Division of Industrial Hygiene.

**Local health administration:**

**John W. Shackelford**, M. D., director  
Division of Local Health Service.

Maternity, infant, and child (preschool)  
health services:

**School health services:**

**Gertrude Nielsen**, M. D., director  
Division of Maternal and Child  
Health.

**Sanitation activities:**

Housing and plumbing control,  
Rodent control and control of garbage  
collection and disposal, and  
Sanitation of bathing places—  
**Harold L. Malone**, engineer  
Division of General Sanitation.

**Milk sanitation—**

**Dale I. Hunt**, milk sanitarian  
Division of Milk Control.

Sanitation of water supplies and  
sewerage systems—

**H. J. Darcey**, chief sanitary en-  
gineer  
Division of Water and Sewage.

**Venereal disease control:**

**A. B. Colyar**, M. D., director  
Division of Venereal Disease Control.

**PENNSYLVANIA STATE DEPT. OF HEALTH****Cancer services:**

**Robert F. McNattin**, M. D., director  
Cancer Division.

**PUERTO RICO DEPARTMENT OF HEALTH**

**Angel M. Marchand**, M. D., Acting  
Commissioner of Health

**Dental services:**

**A. L. Russell**, D. D. S., director  
Division of Dental Health.

**Local health administration:**

**G. J. Van Heuvelen**, M. D., M. P. H.,  
acting director

Division of Local Health Services.

**Nutrition services:**

**A. Triolo**, M. D., director  
Division of Maternal and Child  
Health and Crippled Children.

**VIRGINIA STATE DEPT. OF HEALTH****Crippled children's services:**

(Delete **E. C. Harper**, M. D.), director  
Bureau of Crippled Children.

**Public health education:**

(Delete **J. C. Funk**), director  
Bureau of Health Education.

**Tuberculosis control:****Field services—**

(Delete **E. C. Harper**, M. D.),  
director  
Bureau of Tuberculosis Out-Patient  
Service.

**WASHINGTON STATE DEPT. OF HEALTH****Crippled children's services:**

Maternal, infant, and child (preschool)  
health services:

**Nutrition:**

**J. L. Jones**, M. D., D. P. H., acting  
head

Maternal and Child Health and  
Crippled Children's Section.

**Sanitation activities:****General sanitation—**

**Roy M. Harris**, chief

Division of Public Health Engineer-  
ing.

Housing and plumbing control,

Rodent control and control of garbage  
collection and disposal, and

Sanitation of hotels, camps, and  
bathing places—

**Emil C. Jensen**, head  
Sanitary Engineering Section.



# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 2, 1946

#### Summary

A total of 564 cases of poliomyelitis was reported for the week, as compared with 716 last week and a 5-year (1941-45) median of 285. Although the decline for the country as a whole was less sharp than during the preceding week, decreases occurred in all of the 9 major geographic divisions of the country. Of 30 States reporting 5 or more cases currently, 17 showed a decline (525 to 358), while an increase (125 to 177) occurred in the other 13 States. The geographic distribution of cases reported for the period March 9 (the approximate date of lowest incidence) to November 2, and corresponding periods of 1945 and 1944 is as follows, in the chronological order stated: New England 738, 834, 724; Middle Atlantic 1,710, 3,315, 7,795; East North Central 5,353, 2,232, 3,022; West North Central 6,798, 959, 1,065; South Atlantic 1,094, 1,173, 2,727; East South Central 891, 663, 1,050; West South Central 1,893, 1,281, 409; Mountain 1,552, 520, 174; Pacific 2,442, 967, 659.

A total of 22,937 cases has been reported to date this year, as compared with 12,342 in 1945, 17,888 in 1944, and a 5-year (1941-45) median of 11,379 cases for the corresponding period. These years include the three consecutive high years of 1943, 1944, and 1945. For the same period in 1942, only 3,624 cases had been reported for this period.

The total numbers of cases reported for the current week of diphtheria, influenza, measles, meningococcus meningitis, scarlet fever, smallpox, typhoid and paratyphoid fever, and whooping cough are below the respective corresponding 5-year medians, and for all of these except measles and whooping cough are below those for the preceding week.

A total of 8,616 deaths was recorded during the week in 93 large cities of the United States, as compared with 8,739 last week, 9,023 and 8,969, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 8,919. The cumulative figure for these cities is 397,205, as compared with 393,890 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Nov. 2, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Nov. 2, 1946	Nov. 3, 1945		Nov. 2, 1946	Nov. 3, 1945		Nov. 2, 1946	Nov. 3, 1945		Nov. 2, 1946	Nov. 3, 1945	
NEW ENGLAND												
Maine.....	1	11	1	—	—	—	114	5	5	1	0	0
New Hampshire.....	0	0	0	—	—	—	9	—	—	0	0	0
Vermont.....	0	0	0	—	—	—	47	—	2	0	0	0
Massachusetts.....	15	2	2	—	—	—	139	225	157	2	1	4
Rhode Island.....	0	0	1	1	9	—	2	—	—	0	0	0
Connecticut.....	1	0	1	1	—	1	33	12	18	0	2	2
MIDDLE ATLANTIC												
New York.....	11	16	13	17	12	14	91	58	101	9	15	15
New Jersey.....	13	3	4	3	4	6	14	12	17	5	4	4
Pennsylvania.....	9	7	8	4	—	3	182	58	112	2	4	4
EAST NORTH CENTRAL												
Ohio.....	18	41	21	6	7	7	69	7	26	2	5	5
Indiana.....	1	8	8	—	12	12	4	6	6	1	2	2
Illinois.....	5	2	9	5	4	4	6	142	38	3	7	7
Michigan <sup>1</sup> .....	1	24	10	—	—	—	36	117	117	0	3	3
Wisconsin.....	4	0	4	27	34	12	47	14	54	1	3	2
WEST NORTH CENTRAL												
Minnesota.....	13	7	7	—	—	—	7	4	5	0	3	2
Iowa.....	3	9	8	—	—	—	8	5	17	3	1	0
Missouri.....	4	17	3	1	3	—	2	14	6	0	3	3
North Dakota.....	2	6	5	9	—	—	10	10	10	0	1	0
South Dakota.....	0	0	3	—	—	—	1	2	2	0	1	0
Nebraska.....	1	3	3	5	6	1	3	5	4	1	0	0
Kansas.....	8	2	2	2	—	2	5	8	5	0	0	0
SOUTH ATLANTIC												
Delaware.....	0	1	0	—	—	—	—	—	1	0	1	0
Maryland <sup>1</sup> .....	11	33	6	1	1	2	6	6	14	0	2	5
District of Columbia.....	4	0	0	—	—	—	6	2	2	0	0	1
Virginia.....	13	29	25	203	211	115	7	11	11	0	1	1
West Virginia.....	10	15	10	4	—	2	6	—	7	1	0	0
North Carolina.....	14	123	65	—	—	—	55	17	17	1	1	3
South Carolina.....	7	23	23	130	488	203	2	18	18	0	3	0
Georgia.....	12	41	29	12	4	25	13	8	5	0	0	0
Florida.....	6	8	8	7	7	3	1	—	3	4	2	2
EAST SOUTH CENTRAL												
Kentucky.....	31	13	13	—	2	5	—	55	14	2	1	2
Tennessee.....	7	43	16	3	16	16	3	3	3	0	1	1
Alabama.....	13	33	33	28	32	32	1	3	3	0	1	1
Mississippi <sup>1</sup> .....	10	26	20	—	—	—	—	—	—	0	0	1
WEST SOUTH CENTRAL												
Arkansas.....	12	31	27	19	93	41	26	2	2	0	0	0
Louisiana.....	7	12	12	—	3	3	—	2	1	2	0	0
Oklahoma.....	8	13	13	16	44	44	—	25	9	1	0	0
Texas.....	29	65	64	750	1,535	759	48	51	34	8	8	7
MOUNTAIN												
Montana.....	1	0	0	4	5	4	49	17	17	2	0	0
Idaho.....	0	0	0	8	7	—	3	56	27	0	0	0
Wyoming.....	0	0	0	1	—	4	3	2	4	0	0	0
Colorado.....	6	10	5	8	46	29	4	9	12	1	2	0
New Mexico.....	0	3	1	2	—	—	34	1	1	0	0	0
Arizona.....	2	1	2	86	34	60	8	3	4	0	1	1
Utah <sup>1</sup> .....	2	0	0	—	—	—	9	17	11	0	1	0
Nevada.....	0	0	0	—	—	—	—	—	2	0	0	0
PACIFIC												
Washington.....	13	3	3	—	—	—	17	119	26	0	2	2
Oregon.....	2	3	1	2	5	13	8	10	22	0	0	1
California.....	19	32	27	11	9	22	40	222	191	3	7	7
Total.....	349	719	619	1,366	2,623	1,576	1,168	1,363	1,678	55	88	88
44 weeks.....	13,263	14,102	12,408	202,824	85,595	92,654	647,020	110,156	554,188	5,134	7,103	7,103

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Nov. 2, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Nov. 2, 1946	Nov. 3, 1945		Nov. 2, 1946	Nov. 3, 1945		Nov. 2, 1946	Nov. 3, 1945		Nov. 2, 1946	Nov. 3, 1945	
NEW ENGLAND												
Maine.....	2	4	0	15	30	19	0	0	0	0	2	0
New Hampshire.....	7	0	1	0	6	7	0	0	0	0	0	0
Vermont.....	1	2	1	7	0	3	0	0	0	0	1	0
Massachusetts.....	19	20	8	58	87	140	0	0	0	2	3	3
Rhode Island.....	2	1	0	6	5	5	0	0	0	0	0	0
Connecticut.....	6	11	5	19	14	23	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York.....	39	41	41	208	178	181	0	0	0	5	0	7
New Jersey.....	10	13	13	55	40	48	0	0	0	1	1	2
Pennsylvania.....	12	13	13	77	121	161	0	0	0	3	6	6
EAST NORTH CENTRAL												
Ohio.....	17	11	9	218	230	230	0	0	0	5	4	4
Indiana.....	13	8	2	34	82	62	0	0	1	0	1	1
Illinois.....	72	30	23	78	123	128	0	0	0	8	1	2
Michigan <sup>1</sup> .....	30	7	7	141	99	118	0	0	1	6	2	2
Wisconsin.....	41	43	7	55	74	111	1	0	0	0	1	1
WEST NORTH CENTRAL												
Minnesota.....	32	8	7	19	27	46	0	0	0	0	1	1
Iowa.....	29	18	2	18	53	53	0	0	1	0	0	0
Missouri.....	17	21	4	14	49	48	0	0	0	1	3	3
North Dakota.....	5	0	0	4	9	10	0	1	0	1	0	0
South Dakota.....	8	1	1	1	9	19	0	0	0	0	0	0
Nebraska.....	17	1	1	11	29	23	0	0	0	0	0	0
Kansas.....	33	8	4	27	73	73	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware.....	0	1	1	4	7	6	0	0	0	0	0	0
Maryland <sup>1</sup> .....	7	9	6	13	33	54	0	0	0	2	3	3
District of Columbia.....	0	4	0	9	19	14	0	0	0	0	2	0
Virginia.....	6	3	3	34	99	72	0	0	0	3	4	4
West Virginia.....	0	1	1	58	107	75	0	0	0	0	2	3
North Carolina.....	5	2	2	31	104	106	0	0	0	1	0	4
South Carolina.....	1	1	1	1	15	15	0	0	0	1	0	2
Georgia.....	1	3	3	13	32	32	0	0	0	1	7	7
Florida.....	3	4	4	3	9	8	0	0	0	0	1	1
EAST SOUTH CENTRAL												
Kentucky.....	1	1	2	41	78	64	0	0	0	2	5	5
Tennessee.....	1	11	2	13	83	59	0	0	0	1	6	2
Alabama.....	0	3	2	16	39	39	0	0	0	1	2	2
Mississippi <sup>1</sup> .....	9	5	2	9	20	20	1	0	0	0	2	2
WEST SOUTH CENTRAL												
Arkansas.....	8	3	3	8	32	11	0	0	0	2	2	2
Louisiana.....	10	6	2	6	29	9	0	0	0	1	1	4
Oklahoma.....	3	3	1	9	28	28	0	0	0	0	3	3
Texas.....	7	8	8	28	149	48	0	0	0	11	11	9
MOUNTAIN												
Montana.....	4	2	1	3	10	10	2	0	0	0	0	0
Idaho.....	0	4	0	4	14	14	0	0	0	2	0	0
Wyoming.....	5	0	0	3	0	5	0	0	0	0	0	0
Colorado.....	6	4	2	26	20	28	0	0	0	0	2	1
New Mexico.....	2	2	1	3	25	3	0	0	0	0	1	3
Arizona.....	4	1	0	8	6	6	0	0	0	0	1	1
Utah <sup>1</sup> .....	7	7	4	15	16	9	0	0	0	0	1	1
Nevada.....	0	0	0	0	1	1	0	0	0	0	0	0
PACIFIC												
Washington.....	17	4	4	36	32	42	0	0	0	3	0	1
Oregon.....	4	1	2	19	26	20	0	0	0	2	2	1
California.....	41	36	17	78	221	148	0	0	0	2	3	3
Total.....	564	890	285	1,566	2,601	2,556	4	1	6	67	94	95
44 weeks.....	22,987	12,342	11,379	97,673	151,284	116,334	310	302	655	3,602	4,365	4,910

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately as follows: Massachusetts 2 (salmonella infection); New Jersey 1; Michigan 8; South Carolina 1; Georgia 1; Tennessee 1; Texas 1.

Telegraphic morbidity reports from State health officers for the week ended Nov. 2, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Nov. 2, 1946							
	Week ended—		Med- ian 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever en- demic	Un- du- lant fever
	Nov. 2, 1946	Nov. 3, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	10	23	23								1
New Hampshire.....		8	3								
Vermont.....	10	24	24								1
Massachusetts.....	155	188	168		3						1
Rhode Island.....	18	17	28								
Connecticut.....	25	65	76				1				1
MIDDLE ATLANTIC											
New York.....	205	274	274	10	15		1				5
New Jersey.....	145	145	145			1					3
Pennsylvania.....	97	199	199								5
EAST NORTH CENTRAL											
Ohio.....	72	159	138								3
Indiana.....	7	31	28								6
Illinois.....	110	92	130	5	2		3				9
Michigan <sup>1</sup> .....	145	91	122						2		1
Wisconsin.....	182	63	151								6
WEST NORTH CENTRAL											
Minnesota.....	3	22	42								3
Iowa.....	7	4	11			1					*69
Missouri.....	12	10	11								
North Dakota.....			8				1				1
South Dakota.....		3	0								1
Nebraska.....	4		6								
Kansas.....	15	16	30				1				2
SOUTH ATLANTIC											
Delaware.....	2	1	3								
Maryland <sup>2</sup> .....	30	40	40							2	5
District of Columbia.....	5	7	7								
Virginia.....	73	21	44			19		1			2
West Virginia.....	5	13	13						2		
North Carolina.....	24	53	63							1	
South Carolina.....	22	31	51	2	4						
Georgia.....	3	15	15		2			1	1	16	3
Florida.....	20	3	18	2		1	1			8	
EAST SOUTH CENTRAL											
Kentucky.....	32	21	30							1	
Tennessee.....	4	38	29			1	1			2	1
Alabama.....	8	8	8							5	4
Mississippi <sup>2</sup> .....											3
WEST SOUTH CENTRAL											
Arkansas.....	22	14	17						4	1	2
Louisiana.....	3	1	2	1	1					8	
Oklahoma.....	7	10	1								1
Texas.....	136	98	88	17	187	2		1		13	12
MOUNTAIN											
Montana.....	1		12								1
Idaho.....		20	6								
Wyoming.....			8								
Colorado.....	9	31	31								
New Mexico.....	5	15	6		10	2	1			1	
Arizona.....	8	5	5			17	1				
Utah <sup>2</sup> .....	0	10	12								1
Nevada.....		5	1								
PACIFIC											
Washington.....	14	20	20								2
Oregon.....	15	6	9								
California.....	60	135	135	2	10		2			3	6
Total.....	1,742	2,055	2,379	39	234	44	13	3	9	61	92
Same week, 1945.....	2,055			45	384	113	12	5	6	180	88
Average, 1943-45.....	2,043			45	460	106	8	4	10	*128	
44 weeks: 1946.....	83,800			2,051	14,002	5,602	556	552	784	3,003	*4,468
1945.....	106,880			1,663	21,979	9,630	564	456	632	4,285	4,058
Average, 1943-45.....	115,738		*152,531	1,685	18,919	8,049	577	*449	605	*3,710	

<sup>2</sup> Period ended earlier than Saturday.

<sup>4</sup> 5-year median, 1941-45.

\* Delayed reports, included in cumulative total only.

Anthrax. New York 3. *Psittacosis*. California 1.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Oct. 26, 1946

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	2	0	2	0	3	0	0	-----
New Hampshire:												
Concord.....	0	0	-----	0	2	0	0	0	0	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Massachusetts:												
Boston.....	11	0	-----	0	3	0	12	16	9	0	1	54
Fall River.....	0	0	-----	0	-----	0	0	0	1	0	0	6
Springfield.....	0	0	-----	0	6	0	0	2	1	0	0	17
Worcester.....	1	0	-----	0	-----	0	1	4	1	0	0	10
Rhode Island:												
Providence.....	0	0	-----	0	2	0	1	1	1	0	0	31
Connecticut:												
Bridgeport.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Hartford.....	0	0	2	0	-----	0	1	1	2	0	0	1
New Haven.....	0	0	-----	0	6	0	0	0	0	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo.....	9	0	-----	1	1	0	5	1	6	0	0	6
New York.....	11	1	3	1	7	4	47	41	24	0	5	40
Rochester.....	0	0	-----	0	1	0	2	0	5	0	0	4
Syracuse.....	0	0	-----	0	-----	0	3	3	2	0	0	5
New Jersey:												
Camden.....	1	0	1	0	-----	0	1	0	0	0	0	10
Newark.....	2	0	3	0	2	0	1	0	5	0	0	15
Trenton.....	0	0	-----	0	-----	0	2	1	0	0	0	1
Pennsylvania:												
Philadelphia.....	0	1	2	1	3	1	13	2	26	0	2	14
Pittsburgh.....	3	0	-----	0	59	1	9	9	4	0	0	-----
Reading.....	0	0	-----	0	2	0	0	0	0	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0	-----	0	1	2	4	1	6	0	0	2
Cleveland.....	0	0	8	0	25	1	8	7	17	0	0	11
Columbus.....	0	0	-----	0	1	0	1	0	11	0	0	10
Indiana:												
Fort Wayne.....	0	0	-----	0	5	0	2	0	1	0	0	1
Indianapolis.....	1	0	-----	0	-----	0	2	2	10	0	1	6
South Bend.....	0	0	-----	0	-----	0	0	1	1	0	0	-----
Terre Haute.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Illinois:												
Chicago.....	0	0	-----	2	7	3	22	32	33	0	0	54
Springfield.....	0	0	-----	0	-----	0	4	2	3	0	0	4
Michigan:												
Detroit.....	1	0	-----	0	2	1	6	5	44	0	1	46
Flint.....	0	0	-----	0	-----	0	0	1	3	0	0	3
Grand Rapids.....	0	0	-----	0	1	0	1	2	4	0	0	6
Wisconsin:												
Kenosha.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Milwaukee.....	2	0	-----	0	1	0	1	6	5	0	0	56
Racine.....	0	0	-----	0	-----	0	0	4	5	0	0	1
Superior.....	1	0	-----	0	2	0	0	0	0	0	0	-----
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	1	0	-----	0	-----	0	2	3	0	0	0	1
Minneapolis.....	3	0	-----	0	3	1	1	9	14	0	0	-----
St. Paul.....	2	0	-----	1	-----	1	4	1	5	0	0	3
Missouri:												
Kansas City.....	2	0	-----	0	-----	0	5	6	4	0	0	3
St. Joseph.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
St. Louis.....	6	0	-----	1	-----	0	7	9	7	0	3	-----

## City reports for week ended Oct. 26, 1946—Continued

Division, State, and City	Diphtheria cases	Erysipelas, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyellitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	—	0	—	1	1	2	1	0	0	—
Nebraska:												
Omaha.....	0	0	—	0	—	0	2	10	3	0	0	—
Kansas:												
Topeka.....	0	0	—	0	—	0	1	3	3	0	0	—
Wichita.....	0	0	—	0	1	0	5	0	2	0	0	8
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	—	0	1	0	1	1	3	0	0	—
Maryland:												
Baltimore.....	9	0	1	1	1	0	5	4	4	0	0	19
Cumberland.....	0	0	—	0	—	0	0	0	0	0	0	—
Frederick.....	0	0	—	0	1	0	0	0	0	0	0	—
District of Columbia:												
Washington.....	1	0	1	1	3	0	8	1	11	0	0	7
Virginia:												
Richmond.....	0	0	19	0	3	0	0	1	2	0	0	—
Roanoke.....	1	0	—	0	—	0	1	0	1	0	0	—
West Virginia:												
Charleston.....	0	0	—	0	—	0	0	0	0	0	0	—
Wheeling.....	0	0	—	0	—	0	1	1	0	0	0	—
North Carolina:												
Raleigh.....	0	0	—	0	—	0	0	1	0	0	0	2
Wilmington.....	4	0	—	0	—	0	0	0	1	0	0	—
Winston-Salem.....	0	0	—	0	11	0	1	0	7	0	0	1
South Carolina:												
Charleston.....	0	0	6	0	—	0	0	0	0	0	0	—
Georgia:												
Atlanta.....	0	0	—	0	—	0	0	0	4	0	0	—
Brunswick.....	0	0	—	0	—	0	1	0	0	0	0	—
Savannah.....	0	0	—	0	6	0	0	0	0	0	0	—
Florida:												
Tampa.....	2	0	—	0	—	0	0	0	1	0	0	—
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	3	0	—	0	1	0	6	2	4	0	0	4
Nashville.....	0	0	—	0	—	0	3	0	0	0	0	—
Alabama:												
Birmingham.....	0	0	2	0	—	0	1	0	3	0	0	—
Mobile.....	0	0	—	0	—	2	0	0	1	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	1	0	—	0	—	0	0	2	1	0	0	—
Louisiana:												
New Orleans.....	1	0	—	0	2	0	5	5	1	0	0	—
Shreveport.....	1	0	—	0	—	0	5	1	0	0	0	—
Texas:												
Dallas.....	1	0	—	0	3	0	2	2	3	0	1	—
Galveston.....	1	0	—	0	—	0	0	0	0	0	0	—
Houston.....	0	0	—	0	—	0	5	2	2	0	0	—
San Antonio.....	1	0	1	0	2	0	6	1	1	0	0	1
MOUNTAIN												
Montana:												
Billings.....	0	0	—	0	—	0	0	0	0	0	0	—
Great Falls.....	0	0	—	0	1	0	1	1	0	0	0	—
Helena.....	0	0	—	0	—	0	0	0	0	0	0	—
Missoula.....	0	0	—	0	—	0	1	0	0	0	0	—
Idaho:												
Boise.....	0	0	—	0	—	0	2	1	0	0	0	—
Colorado:												
Denver.....	3	0	8	0	1	0	2	1	3	0	0	16
Pueblo.....	0	1	—	0	—	0	2	3	2	0	0	—
Utah:												
Salt Lake City.....	0	0	—	0	2	0	3	3	3	0	0	1

## City reports for week ended Oct. 28, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	3	0	3	6	3	0	0	5
Spokane.....	0	0	-----	0	-----	0	2	1	1	0	0	-----
California:												
Los Angeles.....	1	0	6	0	1	0	5	9	20	0	0	10
Sacramento.....	1	0	-----	0	-----	0	0	0	0	0	0	-----
San Francisco.....	1	0	1	0	2	1	6	0	11	0	0	4
Total.....	90	3	64	9	189	19	259	236	377	0	14	505
Corresponding week, 1945.....	84	-----	59	14	332	-----	334	-----	535	1	28	625
Average, 1941-45.....	88	-----	62	16	339	-----	315	-----	580	0	20	779

1 3-year average, 1943-45.

2 5-year median, 1941-45.

Anthrax.—Cases: Philadelphia 1.

Dysentery, amebic.—Cases: Boston 1; New York 3; Chicago 6; San Francisco 2.

Dysentery, bacillary.—Cases: Providence 1; New York 80; Philadelphia 1; St. Louis 1; Charleston, S. C., 5; Denver 1; Los Angeles 4.

Dysentery, unspecified.—Cases: San Antonio 12.

Typhemia.—Cases: St. Louis 1.

Typhus fever, endemic.—Cases: Atlanta 1; Tampa 1; New Orleans 2; Houston 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1943, 34,229,100)

	Diphtheria case rates	Epidemiologic, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Polymyellitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	31.4	0.0	5.2	0.0	55	0.0	44.4	62.7	47	0.0	2.0	322
Middle Atlantic	12.0	0.9	4.2	1.4	35	2.3	38.4	26.4	38	0.0	2.2	45
East North Central	3.0	0.0	4.9	1.2	27	4.3	32.2	38.3	87	0.0	1.2	122
West North Central	27.9	0.0	0.0	4.0	8	0.0	55.7	55.5	78	0.0	6.0	30
South Atlantic	28.1	0.0	44.7	3.3	43	0.0	29.8	14.9	50	0.0	0.0	48
East South Central	17.7	0.0	11.8	0.0	6	11.8	59.0	11.8	47	0.0	0.0	24
West South Central	17.2	0.0	2.9	0.0	20	0.0	60.0	37.3	23	0.0	2.9	3
Mountain	23.8	7.9	63.5	0.0	32	0.0	87.4	71.5	79	0.0	0.0	135
Pacific	4.9	8.0	11.5	0.0	10	1.6	26.3	26.3	53	0.0	0.0	31
Total	13.7	0.5	9.8	1.4	29	2.9	39.6	36.0	58	0.0	2.1	77

## TERRITORIES AND POSSESSIONS

## Puerto Rico

Notifiable diseases—4 weeks ended October 5, 1946.—During the 4 weeks ended October 5, 1946, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	10	Syphilis	111
Diphtheria	36	Tetanus	4
Dysentery, unspecified	5	Tuberculosis (all forms)	768
Gonorrhea	140	Typhoid and paratyphoid fever	6
Influenza	50	Typhus fever (murine)	6
Malaria	487	Whooping cough	63
Polymyellitis	62		

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended October 12, 1946.*—During the week ended October 12, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		6		28	111	52	9	68	48	322
Diphtheria.....	1	2	1	30	13	5		3	1	56
German measles.....		1		2	5			3	1	12
Influenza.....						2				2
Measles.....		5	1	65	98	24	39	63	12	307
Meningitis, meningococcus.....				1				1		2
Mumps.....				29	130	27	46	22	60	314
Poliomyelitis.....		3	2	56	36	2		2		101
Scarlet fever.....	2	9	8	56	62	10	1	2	12	163
Tuberculosis (all forms).....		27	10	86	35	65	8	1	59	302
Typhoid and paratyphoid fever.....				2	1				3	6
Undulant fever.....					1			4		5
Veneral diseases:										
Gonorrhoea.....	2	15	21	138	146	47	46	56	98	569
Syphilis.....	6	15	4	109	59	19	11	11	66	360
Whooping cough.....		9	1	21	63	4	4	5	3	110

### JAMAICA

*Notifiable diseases—4 weeks ended October 19, 1946.*—For the 4 weeks ended October 19, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis.....	2	1	Puerperal sepsis.....		1
Chickenpox.....	3	2	Scarlet fever.....	1	1
Diphtheria.....	4	11	Tuberculosis (pulmonary).....	19	54
Dysentery, unspecified.....	2	5	Typhoid fever.....	5	98
Erysipelas.....	2		Typhus fever (murine).....		1
Leprosy.....		2			



## REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

### Cholera

*Manchuria—Kirin Province—Changchun.*—For the period August 11–20, 1946, 197 cases of cholera were reported in Changchun, Kirin Province, Manchuria.

### Plague

*Ecuador—Loja Province.*—For the month of September 1946, 5 cases of plague with 2 deaths were reported in Loja Province, Ecuador.

### Smallpox

*China—Hong Kong.*—For the week ended October 26, 1946, 85 cases of smallpox were reported in Hong Kong, China.

### Typhus Fever

*Ecuador.*—For the month of September 1946, 112 cases of typhus fever with 14 deaths were reported in Ecuador. Provinces reporting the highest incidence are: Pichincha, 32 cases, 6 deaths; Cotopaxi, 20 cases, 1 death; Chimborazo, 12 cases, 1 death; Tungurahua, 10 cases, 2 deaths; Canar, 10 cases.

## DEATHS DURING WEEK ENDED OCT. 26, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 26, 1946	Correspond- ing week, 1945
Data for 93 large cities of the United States:		
Total deaths.....	8,739	8,814
Average for 3 prior years.....	8,918	
Total deaths, first 43 weeks of year.....	388,589	384,867
Deaths under 1 year of age.....	789	586
Average for 3 prior years.....	622	
Deaths under 1 year of age, first 43 weeks of year.....	28,181	26,098
Data from industrial insurance companies:		
Policies in force.....	67,327,830	67,291,931
Number of death claims.....	10,849	12,086
Death claims per 1,000 policies in force, annual rate.....	8.4	9.4
Death claims per 1,000 policies, first 43 weeks of year, annual rate.....	9.5	10.1

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

**G. ST. J. PERROTT, *Chief of Division***

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

**VOLUME 61    NOVEMBER 29, 1946    NUMBER 48**

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With Continuous Caudal Analgesia**



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# Public Health Reports

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## A STATISTICAL STUDY OF DELIVERY WITH CONTINUOUS CAUDAL ANALGESIA, AS COMPARED WITH OTHER METHODS<sup>1</sup>

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LULL, M. D., *Obstetrician, Philadelphia Lying-in Unit of the Pennsylvania  
Hospital*.

Since ether was first used a century ago as an anesthetic in obstetrical cases, there have been searches for a drug which would relieve the pains of childbirth without stopping the uterine contractions necessary to bring about the birth. Many drugs and methods have been tried in recent years, and some have proved valuable for the management of labor but objectionable because of the depressing effect upon the infant. Early in 1942, a new method for controlling childbirth pains was developed by Hingson and Edwards (6, 8), known as continuous caudal analgesia. This use of analgesia was first applied clinically for the relief of pain during several surgical operations on the lower extremities by Southworth and Hingson (5, 7) in the United States Public Health Service Hospital at Stapleton, N. Y., in October 1941. Its first obstetrical application was carried out by Hingson and Edwards (8) in January 1942, in the same hospital. This method of using analgesia has proved most valuable for the control of pain during labor and delivery. It can be started in the early stages of labor and continued through delivery and postpartum repair without increasing the danger to either mother or infant. Many reports of successful results are contained in the literature and the use of the method is increasing rapidly.

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<sup>1</sup> From the Division of Public Health Methods and the Bureau of Medical Services, U. S. Public Health Service.

The authors are indebted to the statistical staff of the Office of Health Statistics and Methods for assistance in the collection of the data.

The history of the development of continuous caudal analgesia has been discussed by Edwards and Hingson (8) in 1942 and later by Hingson and Edwards (6) in 1943. Drs. Hingson and Edwards have visited, for considerable periods of time, some of the leading institutions of medical education and lying-in hospitals in order to train men working in obstetrics in the technique of administering continuous caudal analgesia. In addition, the clinical technique and other aspects of the method have been described in a book by Lull and Hingson (4).

However, no intensive analysis of considerable numbers of deliveries under continuous caudal analgesia has been made prior to the present study, which is being published as a series of papers (1, 2, 3). The present report is a statistical analysis of deliveries with continuous caudal analgesia, done under the supervision of Drs. Hingson, Vaux, and Lull at the Philadelphia Lying-in Unit of the Pennsylvania Hospital during the years 1943-45. The records of deliveries during the years 1942-43 at the same hospital provided a control group receiving good care by the usual methods of handling childbirth. In the city of Philadelphia, 93 percent of all infants born in 1943 were delivered in hospitals; the proportions for white and colored infants were 95 and 81 percent, respectively (ref. 9, pt. II, p. 167).

The present paper is limited to the statistical aspects of the study in the Philadelphia Lying-in Hospital.

#### CONTINUOUS CAUDAL ANALGESIA

There were 2,516 mothers delivered of 2,546 infants with continuous caudal analgesia at the Philadelphia Lying-in Unit of the Pennsylvania Hospital during the period May 1943 through August 1945. These deliveries were done by members of the staff of the hospital and by a group of physicians who were there to learn the technique and use of delivery by the new method.

Metycaine was the drug used for continuous caudal analgesia in 99 percent of the cases. Of the 2,516 mothers delivered with continuous caudal analgesia, 90.4 percent received complete relief from pain, 4.3 percent partial relief, and in only 5.3 percent was there failure to obtain relief from pain. The 90.4 percent with complete relief represents 82.2 percent with relief without any supplementary analgesia, and 8.2 percent with relief by continuous caudal analgesia supplemented by some other anesthetic. As may be seen in figure 1, the proportion of mothers receiving complete relief was about the same for primiparas and multiparas. It was also about the same for mothers of different ages, except for a slightly lower percentage receiving complete relief among those over 35 years (table 1).

TABLE 1.—*Relief from pain among mothers during delivery with continuous caudal analgesia, by age and parity*

Relief from pain	All moth- ers	Primipara, by age					Multipara, by age				
		All ages	Under 25	25-29	30-34	35 and over	All ages	Under 25	25-29	30-34	35 and over
		Percentage with specified pain relief									
All mothers <sup>1</sup> -----	100	100	100	100	100	100	100	100	100	100	100
Complete relief-----	90.4	90.9	91.9	90.0	90.4	88.3	89.8	90.7	89.4	91.2	86.9
Partial relief-----	4.3	4.6	4.7	3.9	4.8	6.7	4.0	4.6	3.7	4.7	2.8
No relief-----	5.3	4.6	3.4	6.0	4.8	5.0	6.1	4.6	6.9	4.1	10.2
Number of mothers <sup>2</sup> -----	2,432	1,294	614	432	188	60	1,188	216	433	363	176

<sup>1</sup> 9 percent (202) of the 2,243 with complete relief had supplementary analgesia to complete the delivery; 136 were among primiparas; 66 among multiparas.

<sup>2</sup> Exclusive of the few mothers with no record as to whether pain was relieved. In this and all other tables the percentages, averages, and rates are based on the number with known data about the item under consideration.

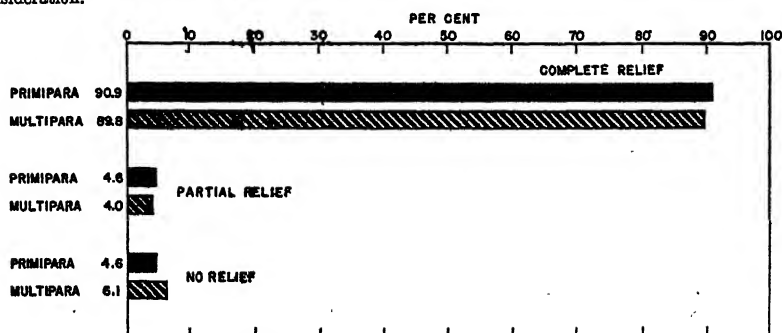


FIGURE 1.—Percentage of mothers with relief from pain during delivery with continuous caudal analgesia, by parity.

The average duration of caudal analgesia was 3.7 hours for primiparas and 2.3 hours for multiparas, with an average duration of 3.0 hours for the whole caudal group. The median, which is defined as the point or value above and below which there are 50 percent of the cases, was 3.0 hours for primiparas, 1.7 hours for multiparas, with a median of 2.2 hours for the whole caudal group. Figure 2 shows by parity the average number of hours of caudal analgesia for specified hours of labor. Table 2 shows the distribution of mothers with specified durations of labor according to the number of hours of continuous caudal analgesia.

In the administration of continuous caudal analgesia it is essential to avoid sudden drops in blood pressure. Figure 3 shows the distribution of mothers according to the drop in systolic blood pressure during delivery, and table 3 shows the data for mothers of different ages. The percentage of mothers whose blood pressure dropped 25 or more millimeters is slightly higher for those over 30 years of age than for mothers from 18 to 29 years. The few under 18 years also show a higher proportion with a drop of 25 or more millimeters.



TABLE 2.—*Distribution of mothers according to hours of continuous caudal analgesia for specified hours of labor*

Hours of continuous caudal analgesia	All moth- ers	Duration of labor in hours										
		Under 3	3-4	5-6	7-8	9-10	11- 12	13- 14	15- 19	20- 24	25- 29	30 and over
Percentage of mothers												
All mothers.....	100	100	100	100	100	100	100	100	100	100	100	100
Under 1.....	11.8	40.0	20.2	15.7	9.5	7.7	9.5	6.4	7.5	8.3	1.6	9.8
1.....	20.7	42.4	39.7	24.8	19.6	18.4	13.6	14.2	13.6	14.0	9.8	6.1
2.....	22.3	17.6	29.1	29.6	29.6	17.7	18.2	15.7	16.4	18.2	18.0	13.4
3.....	14.2	-----	9.9	17.1	16.9	22.4	13.2	13.7	11.4	9.1	13.1	9.8
4.....	10.4	-----	1.0	8.8	12.4	11.0	14.9	16.7	10.7	15.7	9.8	12.2
5.....	6.7	-----	-----	2.8	6.6	9.7	10.7	10.8	11.8	7.4	4.9	3.7
6.....	4.3	-----	-----	1.1	3.4	5.4	7.0	5.4	6.8	9.1	8.2	8.5
7.....	3.5	-----	-----	-----	.8	3.0	5.4	6.4	8.6	6.6	6.6	11.0
8-11.....	4.3	-----	-----	-----	1.1	4.7	5.4	6.9	9.3	6.6	18.0	17.1
12 and over.....	1.8	-----	-----	-----	-----	-----	2.1	3.9	3.9	5.0	9.8	8.5
Mean hours of continuous caudal analgesia.....	3.04	.98	1.42	2.00	2.54	3.18	3.66	4.03	4.27	4.08	5.43	5.35
Number of mothers.....	2,395	85	292	351	378	299	242	204	280	121	61	82

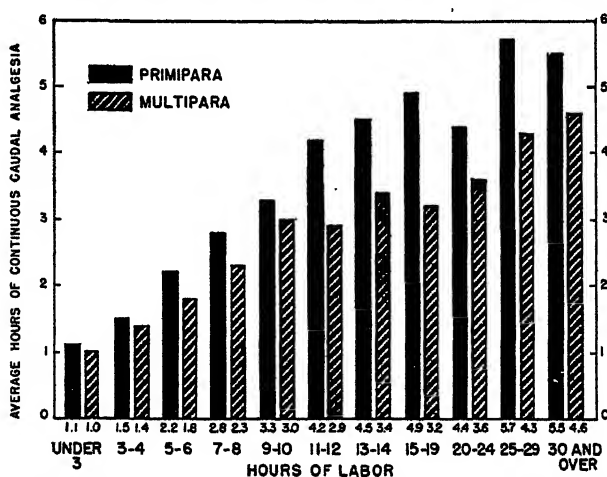


FIGURE 2.—Average hours of continuous caudal analgesia for mothers with specified hours of labor, by parity.

Table 4 shows the distribution according to minimum systolic blood pressure during continuous caudal analgesia for mothers with specified maximum systolic blood pressure during delivery but before caudal analgesia. Table 5 shows the distribution according to the drop in systolic blood pressure during continuous caudal analgesia for mothers with specified systolic pressures before the drop. Of the mothers with pre-caudal systolic blood pressures of less than 105 millimeters, about 45 to 80 percent experienced either a rise or a drop of less than 5 millimeters. But of those with pre-caudal systolic pressures of 135 mm. or more, about 40 to 65 percent experienced drops of 35 to 70 mm.

TABLE 3.—*Distribution of mothers according to drop <sup>1</sup> in systolic blood pressure (in millimeters of mercury) during continuous caudal analgesia*

Drop <sup>1</sup> in systolic blood pressure in mm.	All ages <sup>1</sup>	Age of mother					
		Under 18	18-24	25-29	30-34	35-39	40 and over
		Percentage of mothers					
All mothers.....	100	100	100	100	100	100	100
Rise of 6 or more.....	5.1	2.1	4.8	5.1	5.7	5.9	6.5
Rise of 0-5 or drop of 0-4.....	12.3	6.2	13.1	12.1	12.6	10.3	16.1
Drop of:							
5-14.....	23.9	27.1	22.7	24.4	25.1	23.5	19.4
15-24.....	25.2	12.5	26.5	27.3	23.1	20.6	19.4
25-34.....	17.0	27.1	17.6	16.7	15.2	18.6	12.9
35-44.....	9.4	16.7	9.1	8.8	9.5	10.3	12.9
45-54.....	4.0	2.1	4.4	2.9	4.8	5.4	6.5
55 and over.....	3.1	6.2	1.8	2.7	4.0	5.4	6.5
Number of mothers.....	2,457	48	777	851	546	204	31

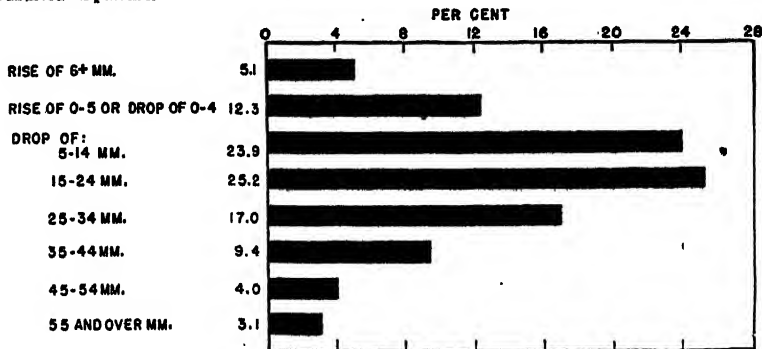
<sup>1</sup> Of patients of all ages, 48.5 percent showed a drop of 1 to 20 mm., inclusive.<sup>2</sup> Changes in blood pressure shown in this table were computed by comparing the two actual readings for each individual patient.

FIGURE 3.—Percentage distribution of mothers according to drop in systolic blood pressure (in millimeters of mercury) during continuous caudal analgesia.

TABLE 4.—*Distribution of mothers with specified maximum systolic blood pressure during labor but before continuous caudal analgesia, according to minimum systolic blood pressure during continuous caudal analgesia*

Maximum blood pressure before analgesia (mm.)	Mean minimum blood pressure (mm.)	All mothers	Minimum systolic blood pressure during continuous caudal analgesia (mm.)										Number of mothers
			Under 65	65-74	75-84	85-94	95-104	105-114	115-124	125-134	135-144	145 and over	
			Percentage of mothers										
All mothers.....	100.2	100	1.9	3.7	9.0	21.7	26.2	21.9	10.1	3.6	1.3	0.5	2,457
Under 85.....	88.3	100	16.7	---	---	50.0	33.3	---	---	---	---	---	6
85-94.....	92.9	100	---	6.5	9.7	51.6	22.6	3.2	3.2	---	---	---	31
95-104.....	98.4	100	2.0	5.4	20.7	25.6	28.6	11.3	5.4	5	5	---	203
105-114.....	97.0	100	1.1	5.0	10.3	27.4	29.9	18.8	4.8	2.2	5	2	643
115-124.....	99.5	100	2.3	3.4	8.3	21.8	27.3	24.9	9.2	1.9	5	5	872
125-134.....	104.1	100	1.7	2.4	6.5	15.6	22.7	26.8	17.7	5.0	9	6	462
135-144.....	107.8	100	3.7	1.2	3.7	13.0	20.5	21.7	19.3	9.9	6.8	---	161
145-154.....	115.3	100	2.6	2.6	5.3	5.3	7.9	26.3	10.5	23.7	10.5	5.3	38
155-164.....	113.9	100	---	9.7	3.2	6.5	12.9	12.9	19.4	16.1	16.1	3.2	31
165 and over.....	125.0	100	---	---	---	---	10.0	30.0	10.0	20.0	10.0	20.0	10

TABLE 5.—*Distribution of mothers with specified maximum systolic blood pressure during labor but before caudal analgesia, according to the drop<sup>1</sup> in systolic blood pressure during continuous caudal analgesia*

Maximum blood pressure before analgesia (mm.)	All mothers	Rise of 6+ mm.	Rise of 0-5 or drop of 0-4	Drop <sup>1</sup> in millimeters of mercury							Number of mothers	
				5-14	15-24	25-34	35-44	45-54	55-64	65 and over		
Percentage of mothers												
All mothers.....	100	5.4	12.7	23.1	25.6	17.0	9.4	3.9	1.9	1.1	2,457	
Under 85.....	100	83.3	-----	-----	16.7	-----	-----	-----	-----	-----	6	
85-94.....	100	82.3	51.6	9.7	6.5	-----	-----	-----	-----	-----	31	
95-104.....	100	17.7	28.6	25.6	20.7	5.4	2.0	-----	-----	-----	203	
105-114.....	100	7.6	18.8	29.9	27.4	10.3	5.0	1.1	-----	-----	643	
115-124.....	100	2.9	9.2	24.9	27.3	21.8	8.3	3.4	2.3	-----	872	
125-134.....	100	1.5	5.0	17.7	26.8	22.7	15.6	6.5	2.4	1.7	462	
135-144.....	100	-----	6.8	9.9	19.3	21.7	20.5	13.0	3.7	4.9	161	
145-154.....	100	-----	5.3	10.5	23.7	10.5	26.3	7.9	5.3	10.6	88	
155-164.....	100	-----	-----	3.2	16.1	16.1	19.4	12.9	12.9	19.4	31	
165 and over.....	100	-----	-----	-----	20.0	10.0	20.0	10.0	30.0	10.0	10	

<sup>1</sup> Changes in blood pressure shown in this table were computed as differences between midpoints of 10-millimeter class intervals of blood-pressure readings before and during caudal analgesia. The percentages for all mothers are remarkably close to those in table 3 which were computed by comparing the two actual readings for each individual patient.

Blood loss was measured for women delivered by continuous caudal analgesia, but no measurements were available for the control group delivered by usual methods. The average for all mothers in the caudal group was 127 cubic centimeters, with 8.6 percent losing more than 250 cc. The corresponding figures for primipara and multipara, respectively, were averages of 132 and 122 cc., and percentages of 8.9 and 8.4 losing more than 250 cc. (table 6).

TABLE 6.—*Distribution according to blood loss (in cubic centimeters) of the mothers delivered with continuous caudal analgesia, by parity*

Parity	Mean blood loss (cc.)	All moth-ers	Blood loss in cubic centimeters						Number of moth-ers
			50 and under	51-100	101-250	251-500	501-750	751 and over	
			Percentage of mothers						
All mothers-----	127	100	28.5	37.3	25.5	7.1	1.0	0.5	2,387
Primipara-----	132	100	25.2	37.6	23.2	7.4	1.2	.3	1,239
Multipara-----	122	100	32.1	36.9	22.6	6.8	.9	.7	1,148

Among the 2,516 mothers delivered by continuous caudal analgesia were 32 or 2.6 percent of the multiparas who had had previous deliveries by this method between the beginning of the work in Philadelphia in May 1943 and the termination of this study in August 1945.

#### COMPARABILITY OF CAUDAL AND CONTROL GROUPS

Most of the infants born at the Philadelphia Lying-in Hospital prior to July 1943 were delivered by the usual methods and with the usual anesthetics and sedatives. It was not practicable to abstract more

than about 1,000 of these cases for comparison with the caudal group. Deliveries by other than continuous caudal analgesia during the period of December 1942 through July 1943 were used for this purpose, comprising a total of 1,024 mothers delivered of 1,034 infants.

The mothers in the control group were delivered largely in the winter months, but deliveries in the caudal group extended over a period of 28 months, including 2 winters and parts of 3 summers. Although the total mortality under 1 year of age is higher in the winter, that under 1 week of age which is dealt with in this paper has little or no seasonal variability. Large proportions of the deaths in these early ages are due to prematurity, congenital malformations, and injury at birth, which causes are essentially without seasonal variation (ref. 10, p. 249).

In the control group 62 percent of the mothers were delivered with nitrous oxide and ether, 30 percent with nitrous oxide alone, 2 percent with ether alone, 0.4 percent with other anesthetics, and 5.6 percent without an anesthetic.

For both caudal and control groups during the respective periods covered, all deliveries by the specified methods were included in the analysis. The mothers who were delivered by continuous caudal analgesia represent an unselected group except for the inclusion of a few with heart disease who could not stand the strain of other methods.

The deliveries in both caudal and control groups were all done in the one large maternity hospital, with Dr. Norris Vaux in charge of the obstetrical services throughout the periods covered. Physicians making deliveries during these periods were members of the staff of the hospital, but a group of graduate student physicians taking the special course in continuous caudal analgesia were observing and assisting with deliveries by that method.

Before considering the results in the caudal and control groups, the characteristics of each category must be examined to insure that the two are comparable with respect to the many factors which would influence the character and outcome of the delivery. Table 8 and more detailed tables have been prepared to make these comparisons.

Table 7 shows the age distribution of mothers in the caudal as compared with the control group. While the caudal group was slightly younger,<sup>2</sup> the differences were small and the average ages were about the same, 27.1 and 27.7 years for the caudal and control groups, respectively.

Of the whole caudal group, 51.9 percent of the mothers were primiparas, as compared with 52.3 percent in the control group. The

<sup>2</sup> The difference between the age distributions of the two groups, as tested by the chi-square method, was of doubtful significance ( $P=0.023$ ).

TABLE 7.—*Distribution of mothers in the caudal and control groups according to age, by parity*

Age	Percentage in each age group						Number of mothers			
	All mothers		Primipara		Multipara		Primipara		Multipara	
	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control
All ages.....	100	100	100	100	100	100	1,307	536	1,209	488
Under 18.....	2.0	0.8	3.7	1.1	0.2	0.4	48	6	2	2
18-19.....	4.8	3.1	7.3	5.6	2.1	.4	96	30	25	2
20-24.....	26.7	25.3	36.6	34.0	16.0	15.8	478	182	193	77
25-29.....	34.8	35.4	33.2	36.4	36.5	34.4	434	195	441	168
30-34.....	22.1	24.6	14.5	17.2	30.4	32.8	190	92	367	190
35-39.....	8.3	9.1	4.0	5.0	12.9	13.5	52	27	156	66
40 and over.....	1.4	1.7	.7	.7	2.1	2.7	9	4	25	13

TABLE 8.—*Miscellaneous comparative data for the caudal and control groups*

	Caudal		Control	
	Number	Percent-age	Number	Percent-age
All mothers.....	2,516	100	1,024	100
Primiparas.....	1,307	51.9	536	52.3
Multiparas.....	1,209	48.1	488	47.7
White.....	2,204	87.6	952	93.0
Colored.....	312	12.4	72	7.0
Private room.....	1,350	53.7	622	60.7
Ward.....	1,166	46.3	402	39.3
Average age.....	27.1		27.7	
Previous history of stillbirth and/or neonatal death.....	68	2.7	26	2.5
Previous history of any abdominal operation.....	421	16.7	192	18.8
Previous history of abdominal operation excluding appendectomy only.....	133	5.3	57	5.6
Total mothers with chronic disease.....	144	5.7	47	4.6
Total mothers with chronic disease, excluding cardiac disease.....	74	2.9	33	3.2
Total mothers with complications during pregnancy.....	22	.87	10	.98
Total mothers with complications during delivery.....	380	15.1	186	18.2
Total mothers with dystocia.....	184	7.3	76	7.4
Total mothers with postpartum fever (100.4° F. or above for 2 or more consecutive days).....	187	7.4	111	10.8
Afterpains, severe (required 3 or more injections of an analgesic).....	422	16.8	229	22.4
Average hospital days.....	10.4		11.2	
Maternal deaths.....	2		2	
Maternal deaths per 1,000 deliveries.....		.79		1.93

age distributions of the primiparas and multiparas are, as would be expected, quite different, but it may be seen in table 7 that for each of these categories, the age distribution of mothers in the caudal group is reasonably comparable with that of mothers in the control group. The average ages of primiparas were 25.3 and 26.0 for the caudal and control groups, respectively, and the average ages of multiparas were 29.2 and 29.5 for the caudal and control groups, respectively.

Of less significance is the type of accommodation at the hospital; 54 percent of the caudal group were private patients as compared with 61 percent of the control group. Of the mothers delivered under continuous caudal analgesia, 12 percent were colored, as compared with 7 percent of the mothers in the control group (table 8).

Chronic disease in the mother and complications during pregnancy

constitute an additional hazard at delivery. Of all mothers in the caudal group, 5.7 percent had some chronic disease, as compared with 4.6 percent of the mothers in the control group. Mothers with a cardiac condition were delivered more frequently with continuous caudal analgesia since this method caused less strain on the heart. Omitting cardiac conditions, 2.9 percent of the mothers in the caudal group and 3.2 percent of those in the control group had some chronic disease. Of all mothers in the caudal group, 0.87 percent had complications during pregnancy, as compared with 0.98 percent in the control group.

In the caudal group 16.7 percent of the mothers had a history of an abdominal operation, as compared with 18.8 percent for the control group. The percentages were slightly higher in both groups for multiparas, presumably because they constituted an older age group. Of the total mothers with a history of an abdominal operation, a large proportion had had appendectomy only. Thus, of the caudal group 11.4 percent gave a history of appendectomy only, as compared with 5.3 percent for other abdominal operations. Corresponding percentages for the control group were 13.2 for appendectomy only and 5.6 for other abdominal operations.

Of the total mothers in the caudal group 2.7 percent had a history of a previous stillbirth or neonatal death, as compared with 2.5 percent of the control group (table 8).

Thus with respect to chronic disease, history of an abdominal operation, history of previous loss of a fetus or infant, and complications during pregnancy, the two groups showed approximately the same percentage of mothers who came to delivery with such conditions.

The size of the infant as well as prior disease may constitute a complication of delivery. Both of these classes of situations exist prior to the beginning of delivery. Of the infants delivered by the caudal method, the average weight at birth was 7.14 pounds as compared with 7.11 pounds in the control group. Reference to table 19 and figure 11 indicates that the distribution of the infants according to weight at birth was similar in the caudal and control groups. In the caudal group 6.6 percent of the infants weighed 5 pounds 8 ounces or less (premature), as compared with 6.5 percent in the control group.

Considering all infants in the caudal group, 7.3 percent of the records indicated dystocia, as compared with 7.4 percent for the control group (table 8). Dystocia as here used refers to a disproportion of pelvic and fetal diameters.

#### DELIVERY IN CAUDAL AND CONTROL GROUPS

The average duration of labor in the caudal group was 11.1 hours, as compared with 11.3 hours in the control group. Among primiparas

who were private patients, the average duration of labor was 11.6 hours for the caudal group and 13.0 hours for the control; among private-patient multiparas the averages were identical for the two groups, 7.5 hours. The average duration was longer for ward patients than for private patients, 12.6 hours for the caudal as compared with 12.4 hours for the control group. It may be seen in table 9 that there are no consistent differences between the caudal and control groups in the average duration of labor for mothers of corresponding ages, hospital status, and parity.

TABLE 9.—*Mean hours of labor by age of mother, parity, and type of accommodation*

Parity and type of accommodation	All ages		Age of mother						Number of mothers (all ages)	
			Under 25		25-29		30 and over			
	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control
Primipara:										
Private room-----	11.6	13.0	11.3	13.8	11.7	12.2	11.6	13.1	695	333
Ward-----	14.8	15.4	14.0	15.7	15.5	15.4	18.0	13.2	566	182
Multipara:										
Private room-----	7.5	7.5	8.4	8.5	7.9	7.5	7.0	7.3	588	250
Ward-----	10.5	9.8	10.1	8.8	11.2	10.4	10.0	10.0	574	208

Although average durations of labor were about the same for the two groups, the controls had more mothers with a very short duration (table 10). This was to be expected because the administration of continuous caudal analgesia requires time. Thus in the control group 2.5 percent of the mothers were in labor for less than 2 hours, as compared with 1.0 percent in the caudal group. Likewise the controls had more mothers with very long hours of labor. Mothers with a duration of 20 or more hours comprised 12.9 percent of the control as compared with 10.9 percent for the caudal group.

TABLE 10.—*Percentage distribution of mothers according to total duration of labor*

Group	Mean hours of labor	All mothers	Duration of labor in hours									Number of mothers
			Under 2	2-3	4-5	6-7	8-10	11-14	15-19	20-29	30 and over	
Caudal.....	11.1	100	1.0	7.3	14.4	16.7	19.5	18.6	11.6	7.5	3.4	2,423
Control.....	11.8	100	2.5	11.7	12.9	14.3	15.2	16.8	13.7	8.9	4.0	973

Figure 4 shows the distribution of infants in the caudal and control groups according to the type of delivery of the mother. Table 11 shows the same data by color and parity. In the caudal group 84.5 percent were operative (including all forceps deliveries) and 15.5 percent were spontaneous deliveries, as compared with 69.0 and 31.0 percent, respectively, for the control group. The major differences between the two

TABLE 11.—*Distribution by type of delivery, color, and parity for the 2,546 births to 2,516 mothers in the caudal group, and the 1,034 births to 1,024 mothers in the control group*

Type of delivery	All colors						White		Colored	
	All mothers		Primipara		Multipara					
	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control
	Percentage for each type									
All infants-----	100	100	100	100	100	100	100	100	100	100
Spontaneous-----	14.8	29.4	5.1	10.8	25.1	49.4	13.5	27.2	24.4	58.9
Breech, spontane- ous-----	.7	1.6	.6	.7	.9	2.6	.7	1.5	1.3	4.1
Forceps, outlet-----	68.3	56.4	74.1	75.9	62.1	35.3	69.3	58.4	61.3	30.1
Forceps, mid-----	8.4	4.0	12.7	5.4	8.9	2.4	8.8	4.2	5.4	1.4
Forceps, a. c. head-----	1.1	.9	1.3	1.3	1.0	.4	1.2	.9	.6	-----
Breech, extraction-----	2.0	1.9	1.8	1.5	2.2	2.4	1.9	1.9	2.2	2.7
Podalic version-----	.4	.4	-----	-----	.7	.8	.4	.4	.8	-----
Cesarean section-----	4.3	5.4	4.4	4.3	4.1	6.6	4.3	5.6	4.4	2.7
Number of infants.	2,546	1,034	1,307	536	1,239	498	2,231	961	315	73

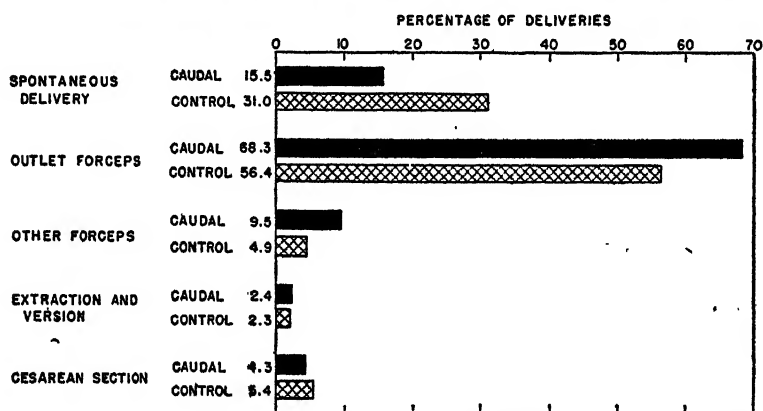


FIGURE 4.—Percentage distribution of infants according to type of delivery of the mothers in the caudal and control groups.

groups are accounted for by fewer spontaneous deliveries and more deliveries with forceps, especially outlet forceps, in the caudal group. Considering all forceps deliveries together, 78 percent of the caudal group were delivered with forceps as compared with 61 percent of the control group.

Table 12 shows for each type of delivery the percentage of mothers on whom an episiotomy was done. Considering all types of deliveries, episiotomy was used more frequently in the caudal group, but the reverse was true in the case of forceps deliveries.

Of the mothers with continuous caudal analgesia the third stage of labor lasted less than 5 minutes in 50 percent of the cases, and less than 3 minutes in 30 percent of the cases. The corresponding figures for the control group were 34 percent and 21 percent for periods less



TABLE 12.—*Percentage of mothers for whom an episiotomy was done, by type of delivery and parity*

Group	Percentage with episiotomy					Number of deliveries				
	All types <sup>1</sup>	Spontaneous <sup>2</sup>	For-cps, outlet	For-cps, mid	Other types <sup>3</sup>	All types <sup>1</sup>	Spontaneous <sup>2</sup>	For-cps, outlet	For-cps, mid	Other types <sup>3</sup>
All mothers:										
Caudal.....	78.9	37.5	87.7	86.0	76.1	1,924	149	1,524	184	67
Control.....	70.7	31.5	90.9	92.7	68.7	691	101	530	38	22
Primipara:										
Caudal.....	91.4	65.3	94.2	89.2	82.5	1,142	49	912	148	33
Control.....	88.3	46.8	94.3	93.1	86.7	463	29	384	27	13
Multipara:										
Caudal.....	65.8	31.1	79.5	75.0	70.8	782	100	612	36	34
Control.....	51.2	27.8	83.0	91.7	50.0	238	72	146	11	9

<sup>1</sup> Excluding cesarean section.<sup>2</sup> Including breech, spontaneous.<sup>3</sup> Including breech extraction and podalic version.

than 5 minutes and less than 3 minutes, respectively. More detailed data are shown in table 13. Considering all infants together, the mean duration of the third stage of labor was 6.6 minutes for the caudal and 8.9 minutes for the control group (fig. 5). The difference of 2.3 minutes is more than seven times the standard error of that difference, indicating that it is much larger than would be expected to occur by chance. Considering the data for white and colored separately, and for primiparas and multiparas separately, white primiparas in the caudal group averaged 7.6 minutes, as compared with 10.3 minutes for the control group. The corresponding averages for white multiparas were 5.8 and 7.6 minutes (table 14). Similarly, among the colored the average duration of the third stage of labor was consistently lower in the caudal group, although the difference was small for colored multiparas. The median duration of the third stage of labor was similarly lower in the several caudal groups than in the corresponding control groups.

TABLE 13.—*Distribution of mothers according to duration in minutes of third stage of labor*

Group	All moth- ers	Duration of third stage in minutes								Mean <sup>1</sup>	Stand- ard devi- ation	Stand- ard error of mean	Med- ian
		Un- der 2	2-3	4-5	6-7	8-9	10-14	15-19	20 and over				
		Percentage of mothers											
Caudal <sup>2</sup> -----	100	11.7	30.5	16.7	9.4	7.9	14.1	5.9	3.8	6.6	7.14	0.14	4.4
Control <sup>2</sup> -----	100	10.4	17.9	11.9	11.7	9.4	19.1	12.7	6.8	8.9	8.70	.27	7.2

<sup>1</sup> Difference between means of caudal and control:  $2.3 \pm 0.31$  (standard error).<sup>2</sup> Based on 2,506 caudal and 1,016 control mothers with known duration of third stage of labor.

Severe afterpains (requiring three or more injections of an analgesic drug) were less frequent in the caudal group, 16.8 percent of the

TABLE 14.—Average duration of the third stage of labor of white and colored mothers

Group	Average duration in minutes						Number of mothers		
	Mean duration			Median duration					
	Total	White	Colored	Total	White	Colored	Total	White	Colored
All mothers:									
Caudal.....	6.6	6.7	5.4	4.4	4.7	3.4	2,506	2,197	309
Control.....	8.9	9.0	7.0	7.2	7.3	5.2	1,016	946	71
Primipara:									
Caudal.....	7.4	7.6	6.0	5.1	5.4	3.6	1,301	1,131	170
Control.....	10.3	10.3	10.1	9.2	9.3	8.0	533	503	30
Multipara:									
Caudal.....	5.7	5.8	4.6	3.9	4.0	3.2	1,205	1,066	139
Control.....	7.4	7.6	4.8	5.7	5.9	3.4	483	442	41

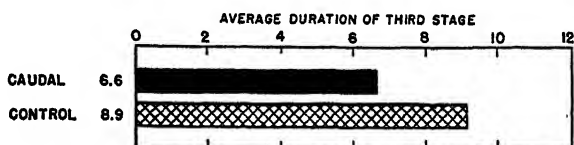


FIGURE 5.—Average duration in minutes of the third stage of labor for the caudal and control groups.

mothers in the caudal group experiencing severe afterpains, as compared with 22.4 percent in the control group (fig. 6; table 8). This difference is definitely significant; that is, it is larger than would be expected to occur by chance.<sup>3</sup> It should be noted, however, that mothers in the caudal group received routinely  $\frac{1}{8}$  to  $\frac{1}{4}$  grain of morphine within an hour after delivery. This procedure may account for some of the difference.

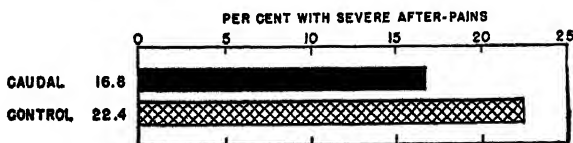


FIGURE 6.—Percentage of mothers with severe afterpains in the caudal and control groups ("Severe"—requiring three or more injections of an analgesic drug).

Of the mothers in the caudal group, 16.7 percent had one or more postpartum catheterizations, as compared with 14.1 percent in the

<sup>3</sup> The fourfold table and chi square were used to test the statistical significance of the differences between the caudal and control groups with respect to the several measures that are expressed in rates or percentages. A complete description of the fourfold-table method and the resulting chi square, together with a table from which "P" is read, is included in Pearl, Raymond, *Medical Biometry and Statistics*, 3rd edition, W. B. Saunders Company, 1940, pp. 324-329 and table B of Appendix IV, pp. 480-488.

The value P (probability) gives the probability of obtaining by chance, in samples of the size under consideration, a difference of the given magnitude or larger, between the rates for the two groups, if the true difference is zero. P of 0.01 or less (1 in 100 trials) is commonly considered as "statistically significant." This expression means that the difference between the rates for the caudal and control groups is larger than would be expected to occur by chance. With P of 0.02 to 0.05, the difference is said to be "of doubtful or borderline significance," and when P is larger than 0.05 the difference is said to be "not statistically significant," that is, it may have occurred by chance. In the present study P of 0.001 or less is described as "definitely significant", in the statistical sense that the difference is sufficiently large that the probability of its occurrence by chance is very small.

control group (table 15). However, 2.1 percent of mothers in the caudal group had four or more catheterizations as compared with 2.4 percent for the control group. The mean number for mothers with one or more catheterizations was 1.9 catheterizations in the caudal and 2.2 catheterizations in the control group.

TABLE 15.—*Postpartum catheterizations among mothers in the caudal and control groups, by color*

Color	Mean for those with one or more catheterizations	Postpartum catheterizations								All mothers
		Percentage of mothers with:				Number of mothers with:				
		1	2	3	4 or more	1	2	3	4 or more	
All mothers:										
Caudal.....	1.9	11.0	2.6	1.0	2.1	276	65	26	52	2,516
Control.....	2.2	8.1	2.7	.9	2.4	83	28	9	25	1,024
White:										
Caudal.....	1.9	11.1	2.9	1.2	2.1	244	63	26	47	2,204
Control.....	1.7	8.3	2.9	.8	2.5	79	28	8	24	932
Colored:										
Caudal.....	.9	10.3	.6	-----	1.6	32	2	-----	5	312
Control.....	2.7	5.6	-----	1.4	1.4	4	-----	1	1	73

A tabulation was made of mothers who had a temperature of 100.4° F. or above for two or more consecutive days following delivery. In the caudal group, 7.4 percent had fever by this standard, as compared with 10.8 percent in the control group—a difference which was definitely significant (fig. 7 and table 8).

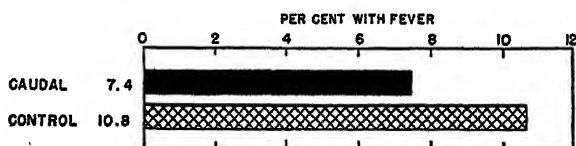


FIGURE 7.—Percentage of mothers who had a postpartum temperature of 100.4° F. for two or more consecutive days in the caudal and control groups.

Although the samples are too small to measure maternal mortality, the mortality in the two groups should be recorded. There were 2 deaths of mothers among the 2,516 delivered by continuous caudal analgesia, a rate of 0.79 maternal deaths per 1,000 mothers delivered, as compared with a rate of 1.93 per 1,000 mothers in the control group, based also on 2 deaths among the 1,024 mothers (table 8). As might be expected with these small numbers of deaths, this difference is not statistically significant; that is, it may have occurred by chance.

Most of the mothers had an examination of the uterus 6 weeks after parturition. However, the results of the examination of patients under the care of private physicians were frequently not entered on the hos-

pital record; thus the results are unknown for many of the private patients. Among ward patients 3.9 percent of the mothers in the caudal group showed subinvolution of the uterus as compared with 8.3 percent of those in the control group (table 16). Of the private patients for whom the results were entered on the hospital record, 5.5 percent of those in the caudal group showed subinvolution of the uterus, as compared with 9.5 percent of the private patients in the control group. When private and ward patients are combined, the proportions with subinvolution were 4.4 percent for the caudal and 8.5 percent for the control group (fig. 8). A difference as large or larger than this amount is definitely significant in the statistical sense of being much larger than would be expected to occur by chance.

TABLE 16.—Percentage of mothers found to have subinvolution of the uterus on examination 6 weeks after delivery

	Mothers with subinvolution of uterus						Number of mothers with records of post-partum examination		
	Percentage of those examined			Number					
	Private and ward	Private room	Ward	Private and ward	Private room	Ward	Private and ward	Private room	Ward
Caudal.....	4.4	5.5	3.9	72	29	43	1,629	524	1,105
Control.....	8.5	9.5	8.3	39	8	31	459	84	375

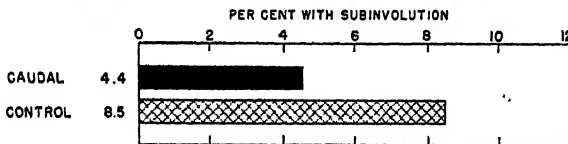


FIGURE 8.—Percentage of mothers found to have subinvolution of the uterus on examination 6 weeks after delivery in the caudal and control groups.

The days of hospital care following delivery are influenced by rather artificial factors which manifest themselves in this study with a considerably longer duration of hospital stay for private than for ward patients. However, the differences between the average hospital stay for the caudal and control groups are small when comparisons are made separately for private and ward patients. The differences tend toward a slightly shorter hospital stay in the caudal than in the control group.

#### NEONATAL MORBIDITY, NEONATAL MORTALITY, AND STILLBIRTHS

In any study of the relief of childbirth pain, the health and viability of the infant must be considered as well as the health of the mother. The delay in respiration of the newborn infant and the necessity

TABLE 17.—*Delay in respiration of two or more minutes among full term and premature infants discharged alive from the hospital*

Term	Percentage				Number					
	Infants with delayed respiration <sup>1</sup>		Infants requiring special agent		Infants with delayed respiration <sup>1</sup>		Infants requiring special agent		All infants discharged alive	
	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control
All infants .....	3.6	9.6	2.5	8.7	89	94	62	85	2,488	981
Full term .....	3.2	8.8	2.2	7.9	76	82	52	74	2,345	933
Premature <sup>2</sup> .....	9.1	25.0	7.0	22.9	13	12	10	11	143	48

<sup>1</sup> Includes infants requiring special agent for respiration.<sup>2</sup> Premature includes infants weighing 5 pounds 8 ounces (2,500 grams) or less.

for a special agent to induce respiration may be indications of the effect upon the infant of anesthetics given to the mother during labor. Table 17 shows the proportion of infants discharged alive from the hospital in whom respiration was delayed for more than 2 minutes or in whom special agents were used to induce respiration. Among those delivered by continuous caudal analgesia, the group of infants who had difficulty in breathing amounted to 3.6 percent of the total, as compared with 9.6 percent of the control group, a difference which is definitely significant. In the caudal group 2.5 percent of the infants required the use of a special agent to induce respiration as compared with 8.7 percent in the control group, a difference which is also definitely significant (fig. 9). In the caudal group there were 143 premature <sup>4</sup>

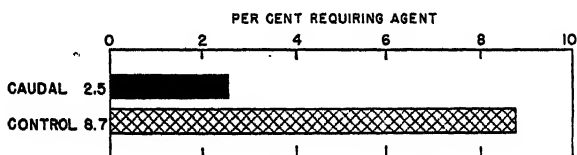


FIGURE 9.—Percentage of infants who required a special agent to induce respiration in the caudal and control groups.

infants who were discharged alive from the hospital, and 48 such infants in the control group. Of the 143 premature infants in the caudal group, 13 or 9.1 percent had a delay of more than 2 minutes before respiration began or had a special agent to induce respiration, as compared with 12 or 25.0 percent in the control group. Of these premature infants who experienced difficulty in breathing, all except 3 in the caudal and 1 in the control group required a special agent to induce respiration.

The infants were under direct observation only for the short period that they were in the hospital. Since the duration of the hospital

<sup>4</sup> Infants with birth weights of 5 pounds, 8 ounces (2,500 grams), or less, were classed as premature, in accordance with the standard adopted by the American Pediatric Society.

stay varied, it seemed better to compare the weight of the infant at 7 days of age with his birth weight than to consider weights at the time of discharge from the hospital. Table 18 shows for the caudal and control groups the percentage of infants who had made a net gain of one or more ounces by the seventh day of life. Considering all infants, 11.9 percent of those in the caudal group made such a net gain in weight in the first 7 days of life, as compared with 9.2 percent in the control group (fig. 10). A difference of this magnitude is of doubtful or borderline significance in the statistical sense in that although probably real it may have been due to chance.

TABLE 18.—Percentage of infants with a net gain in weight by the seventh day of life, by color and type of feeding

Group	Total			White			Colored		
	All infants	Breast-fed	Bottle-fed	All infants	Breast-fed	Bottle-fed	All infants	Breast-fed	Bottle-fed
Percentage with net gain of one or more ounces									
Caudal.....	11.9	14.6	5.6	11.2	14.1	4.8	17.0	17.7	14.3
Control.....	9.2	12.5	4.9	8.9	12.4	4.6	13.2	14.3	10.5
Total number with known weights									
Caudal.....	2,487	1,753	734	2,187	1,516	671	300	237	63
Control.....	987	559	428	919	510	409	68	49	19

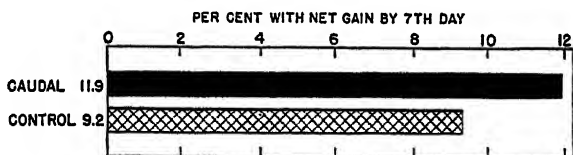


FIGURE 10.—Percentage of infants who made a net gain in weight by the seventh day of life in the caudal and control groups.

A higher proportion of the infants in the caudal group were breast-fed than in the control group; in the caudal group 70 percent of the infants were breast-fed as compared with 57 percent in the control group. Considering only breast-fed infants, 14.6 percent of the caudal group weighed more at the end of 7 days than at birth, as compared with 12.5 percent in the control group. Although the difference is small, the percentage is larger for both white and colored infants in the caudal than in the control group. Among bottle-fed infants, 5.6 percent of those in the caudal group weighed more at the end of 7 days than at birth, as compared with 4.9 percent of the infants in the control group. Again this small excess for the caudal group appeared for both white and colored infants.

Table 19 and figure 11 show the distribution of the infants in the

TABLE 19.—*Distribution of infants according to weight at birth*

Birth weight in pounds and ounces	Percentage				Number			
	Total infants (live and still)		Single live births		Total infants (live and still)		Single live births	
	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control
Total.....	100	100	100	100	2,544	1,030	2,464	990
Under 4-8.....	2.4	4.1	1.3	2.2	62	42	32	22
4-8 to 4-15.....	1.2	1.1	.9	.8	30	11	22	8
5-0 to 5-7.....	2.6	2.0	2.4	1.8	67	21	58	18
5-8 to 5-15.....	5.8	6.0	5.6	5.9	147	62	139	58
6-0 to 6-7.....	11.4	10.8	11.4	11.0	291	111	282	109
6-8 to 6-15.....	17.9	16.3	18.2	16.9	455	168	449	167
7-0 to 7-7.....	20.2	19.3	20.7	20.0	514	199	509	198
7-8 to 7-15.....	16.7	17.5	17.2	18.0	426	180	423	178
8-0 to 8-7.....	10.6	11.0	10.9	11.3	270	113	269	112
8-8 to 8-15.....	5.9	5.8	6.1	5.9	160	60	150	58
9-0 to 9-7.....	3.3	3.2	3.4	3.2	84	33	83	32
9-8 to 9-15.....	1.4	2.1	1.4	2.2	35	22	35	22
10 and over.....	.5	.8	.5	.8	13	8	13	8
All infants.....	Average weight (pounds)				Number of births			
	Caudal	Control	Caudal	Control	Caudal	Control	Caudal	Control
All infants.....	7.14	7.11	7.21	7.22	2,544	1,030	2,464	990
Twins.....	4.76	4.92	4.77	4.92	59	18	57	18

1 These figures refer to live twins; weight refers to that of each twin.

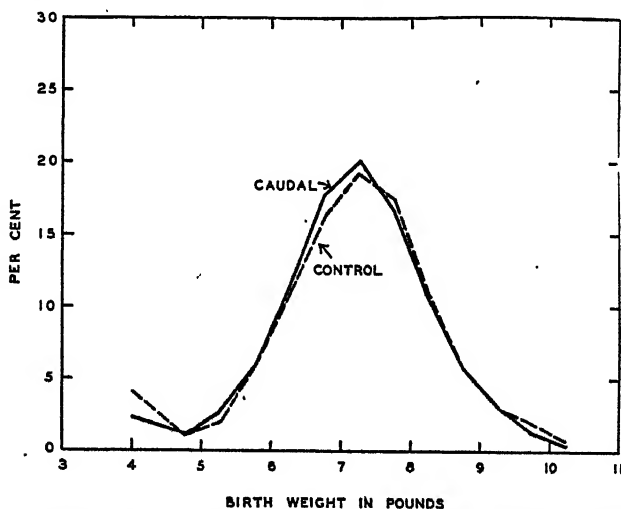


FIGURE 11.—Percentage distribution of infants according to weight at birth in the caudal and control groups.

caudal and control groups according to weight at birth. The average weights at birth were 7.14 pounds for the caudal and 7.11 pounds for the control group, and the distributions of birth weights in the two groups were similar. In the caudal group the average weight at birth for infants who were breast-fed was 7.21 pounds, as compared with 7.30 pounds in the control group. During the first week of life there was a net loss of 3.75 ounces per infant for the caudal group as compared

with 3.39 ounces for the control group. For bottle-fed infants the corresponding average weights at birth were 7.02 pounds and 7.05 pounds, respectively, and during the first week of life there was a net loss of 5.52 ounces per infant for the caudal group as compared with 5.77 ounces for the control group.

Thus a higher percentage of infants in the caudal group showed a net gain during the first week of life, but in terms of average ounces lost for all infants in the two categories, the differences between the caudal and control groups were very small and not consistently in favor of either group.

Among infants in the caudal group, stillbirths amounted to 9.1 per 1,000 live births, as compared with 24.8 per 1,000 in the control group, a difference which is definitely significant (fig. 12). Corresponding ratios for white stillbirths were 8.1 per 1,000 live births for the caudal and 23.4 per 1,000 for the control group; and for the few colored stillbirths, 16.1 per 1,000 live births for the caudal and 42.9 per 1,000 for the control group (table 20). The difference between caudal and control groups is statistically significant for white stillbirths, but in the small colored groups even this large difference may have resulted from chance.

TABLE 20.—*Stillbirth and neonatal mortality<sup>1</sup> per 1,000 live births among mothers of different ages, by color*

Group	Rate per 1,000 live births						Number				
	All infants			Infants of mothers			All infants		Infants of mothers		
	Total	White	Colored	Under 25	25-29	30 and over	White	Colored	Under 25	25-29	30 and over
Stillbirths and neonatal mortality: <sup>1</sup>											
Caudal.....	20.6	17.2	45.2	14.2	13.6	35.4	38	14	12	12	28
Control.....	46.6	43.7	71.4	47.8	30.6	59.0	41	5	14	11	21
Neonatal mortality <sup>1</sup>											
Caudal.....	11.5	9.0	29.0	8.3	11.3	15.2	20	9	7	10	12
Control.....	20.8	20.2	28.6	20.6	11.1	30.9	19	2	6	4	11
Stillbirths											
Caudal.....	9.1	8.1	16.1	5.9	2.3	20.2	18	5	5	2	16
Control.....	24.8	23.4	42.9	27.3	19.4	28.1	22	3	8	7	10
Total live births							2,213	310	847	884	792
Caudal.....							939	70	298	360	356
Control.....											

<sup>1</sup> Neonatal mortality includes deaths within the first week of life only.

Since the infants were under observation only for the short time in the hospital, and since the hospital stay varied for different mothers and infants, neonatal deaths were defined as those which occurred within the first week of life, practically all mothers being in the hospital for that minimum period.

Deaths in the first week of life in the caudal group amounted to 11.5 per 1,000 live births, as compared with 20.8 per 1,000 in the control



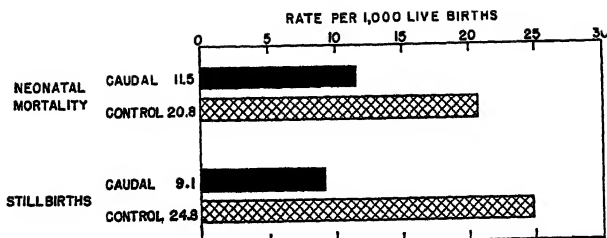


FIGURE 12.—Stillbirths and neonatal mortality per 1,000 live births in the caudal and control groups.

group (fig. 12). The corresponding figures in the white group were 9.0 per 1,000 live births for the caudal and 20.2 per 1,000 for the control group, and for the colored, 29.0 per 1,000 live births for the caudal and 28.6 per 1,000 for the control group (table 20). A difference of such a magnitude as that between the rates for white infants in the caudal and control groups is statistically significant, but the two rates for colored infants are essentially the same. It may be noted that the mortality of the first week of life of 20.8 per 1,000 live births for all infants in the control group was approximately the same as that for the country as a whole—22.3, 20.8, and 19.9 per 1,000 live births for the years 1941, 1942, and 1943, respectively (ref. 9, pt. 1, p. 18).

Taking into account both stillbirths and neonatal deaths, the total loss of infants amounted to 20.6 per 1,000 live births in the caudal group, as compared with 45.6 per 1,000 in the control group, a difference which is definitely significant (table 20). Among white infants the corresponding rates were 17.2 per 1,000 live births for the

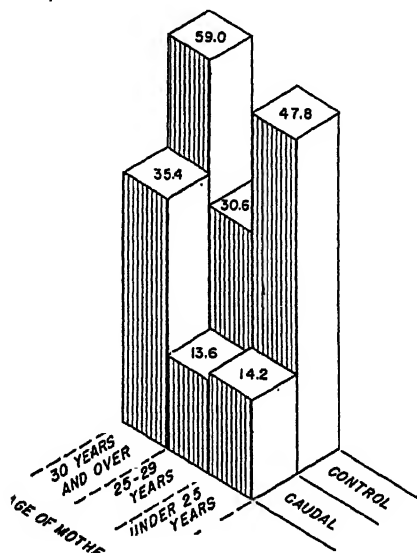


FIGURE 13.—Stillbirths and neonatal mortality per 1,000 live births among mothers of different ages in the caudal and control groups.

caudal and 43.7 per 1,000 for the control group, a difference which is also definitely significant. Among the colored infants the corresponding rates were 45.2 per 1,000 live births in the caudal group and 71.4 per 1,000 in the control group. In the small group of colored mothers, even this large difference between the rates for the caudal and control groups may have occurred by chance; that is, it is not statistically significant.

Figure 13 shows stillbirth and neonatal mortality in the caudal and control groups among infants of mothers of three age groups: under 25 years, 25-29, and 30 years and over. The higher stillbirth and neonatal mortality rates in the control group are consistent for all three age groups of mothers.

It is generally recognized that premature infants have a high neonatal mortality but there are few data on actual death rates among premature as compared with full-term infants. In this study there were 167 premature infants in the caudal group and 66 in the control. In the caudal group neonatal mortality was 132 per 1,000 premature live births, as compared with 227 per 1,000 in the control group (fig. 14 and table 21). In this small group of premature infants, a difference of this magnitude or larger would occur by chance 7 times in 100 trials and cannot be considered as statistically significant. Among full-term infants the neonatal mortality rates were 3.0 and 6.4 per 1,000 full-term births in the caudal and control groups, respectively, but this difference also is not statistically significant.

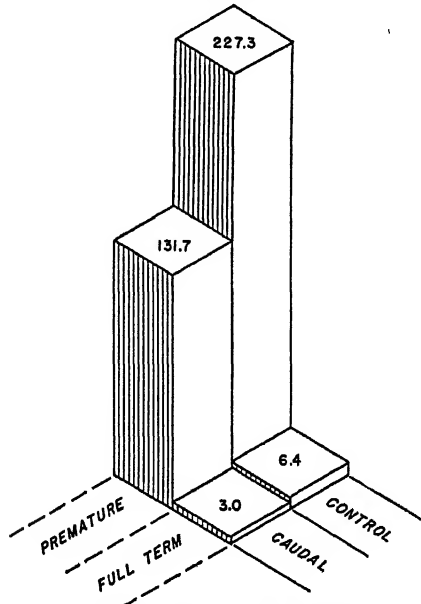


FIGURE 14.—Neonatal mortality per 1,000 live births among full-term and premature infants in the caudal and control groups.

TABLE 21.—*Neonatal mortality<sup>1</sup> among full-term and premature infants*

Group	Neonatal mortality <sup>1</sup> per 1,000 live births			Number of neonatal deaths <sup>1</sup>			Number of live births		
	All infants	Full- term	Prema- ture <sup>2</sup>	All infants	Full- term	Prema- ture <sup>2</sup>	All <sup>3</sup> infants	Full- term	Prema- ture <sup>2</sup>
Caudal.....	11.5	3.0	131.7	29	7	22	2,523	2,354	167
Control.....	20.8	6.4	227.3	21	6	15	1,009	942	66

<sup>1</sup> Neonatal mortality includes deaths within the first week of life only.<sup>2</sup> Premature includes infants weighing 5 pounds 8 ounces (2,500 grams) or less.<sup>3</sup> Includes a few unknown for maturity.

## SUMMARY

This paper presents the results of the delivery with continuous caudal analgesia of 2,516 mothers as compared with a control group of 1,024 mothers delivered with the usual anesthetics and sedatives. All of the deliveries took place at the Philadelphia Lying-in Unit of the Pennsylvania Hospital. Data about mothers in the two groups indicate that when they came to delivery they were comparable with respect to age, parity, state of health, and many other factors that might influence the outcome of childbirth.

There was no evidence of danger to the mothers delivered with continuous caudal analgesia, although a third of them showed a marked drop in systolic blood pressure during the administration of the drug. Complete relief was obtained for 90 percent of the mothers during labor and delivery. The postpartum action of the uterus was better in the caudal than in the control group.

There were fewer stillbirths and fewer deaths of infants during the first week of life in the caudal than in the control group. Thus more favorable results for the caudal group were indicated in terms of the comfort of the mother during labor and the survival of the infant during the dangerous first week of life.

If the method of continuous caudal analgesia could be applied to all deliveries in the United States with the same results as in the Philadelphia Lying-in Hospital, the present estimated loss of about 125,000 viable infants through stillbirth and death within the first week of life could be cut in half.

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## PUBLIC HOUSING DESIGN

The Federal Public Housing Authority has recently announced the publication of *Public Housing Design*, a 300-page volume summarizing a decade of experience in the design and construction of low-rent housing developments. The announcement states:

Appearing when more large-scale private developments are being undertaken than ever before, [it] is expected to be of interest to many commercial home builders. It covers the entire scope of community development from preliminary surveys through planning and actual construction to final landscaping around the new home . . .

A large number of sources were tapped for data and experiences to give *Public Housing Design* a broad approach encompassing conditions found in all sections of the Nation. The criticisms of methods and techniques are based on results obtained in actual community developments with comments by qualified technical observers on local, State, and regional planes.

Among the subjects discussed are the general considerations of project design; site selection, planning and engineering; dwelling types and plans; community buildings; service structures; materials; utilities; mechanical and electrical design; lawns and planting.

Photographs, diagrams, and charts are used profusely to illustrate the text. An index of nearly 500 subjects makes the volume useful as a handbook for reference and study.

Both illustrations and text point forcefully to the wide variety of solutions which the public low-rent housing program has found to exist in the problem of community development planning . . .

*Public Housing Design* was produced by the FPHA's Development and Reutilization Branch headed by William P. Seaver, Assistant Commissioner. Gilbert L. Rodier, Director of the FPHA Technical Division, was in charge of preparing the report.

Copies may be obtained from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C., for \$1.25 each.

## AUSTRALIAN QUARANTINE REQUIREMENT<sup>1</sup>

The following circular of information regarding Austrian quarantine measures against smallpox has been sent to the United States Public Health Service by the United States State Department. The Austrian Embassy has informed the State Department that the circular has been distributed to the United States War Department, commercial air lines, and certain travel agencies.

### Passengers by Air to Australia—Quarantine Regulations

The Australian Department of Health has drawn attention to the fact that the Australian Quarantine (Air Navigation) regulations require that persons arriving in Australia by air shall produce, at the first landing place, a certificate of vaccination issued within three years of arrival in Australia, or shall submit to vaccination.

The Department advises that it is intended in future to apply these regulations strictly and to institute legal proceedings where breaches are detected.

It is intended also that persons who can not produce a vaccination certificate issued less than three years and *more than twelve days* before arrival in Australia shall be subject to surveillance under the Quarantine Act for the full period of fourteen days after arrival in Australia. This will entail a daily visit to a medical officer of this Department at one of the capital cities, and will of necessity somewhat restrict the movements of the persons concerned.

<sup>1</sup> From the Foreign Quarantine Division, U. S. Public Health Service.

# PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

October 6—November 2, 1946

The accompanying table (table 1) summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended November 2, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941-45.

TABLE 1.—Number of reported cases of nine communicable diseases in the United States during the 4-week period October 5–November 2, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941–45

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	1,463	2,809	2,480	5,759	8,390	5,543	4,052	4,682	5,194
New England.....	96	32	25	10	48	25	1,154	698	725
Middle Atlantic.....	149	101	101	35	29	42	1,022	698	862
East North Central.....	144	274	238	90	162	162	582	867	702
West North Central.....	138	137	133	51	25	33	65	137	297
South Atlantic.....	299	998	946	1,150	2,610	1,638	334	235	235
East South Central.....	274	553	855	143	236	236	44	153	153
West South Central.....	208	471	449	3,850	4,918	2,977	216	188	186
Mountain.....	42	65	65	381	305	395	280	485	485
Pacific.....	113	178	160	49	87	157	355	1,221	861
	Meningococcus meningitis			Polliomyelitis			Scarlet fever		
United States.....	285	331	331	3,298	2,045	1,555	5,754	9,009	8,970
New England.....	14	18	31	232	164	123	401	540	715
Middle Atlantic.....	49	83	85	343	436	432	1,053	1,264	1,281
East North Central.....	46	74	74	974	520	319	1,774	2,133	2,133
West North Central.....	30	33	33	900	255	165	421	815	899
South Atlantic.....	29	27	39	136	146	146	747	1,602	1,504
East South Central.....	23	20	20	66	111	71	367	670	670
West South Central.....	36	29	29	177	125	64	179	683	355
Mountain.....	11	10	9	133	90	19	234	345	345
Pacific.....	27	37	37	337	198	117	578	957	866
	Smallpox			Typhoid and para-typhoid fever			Whooping cough <sup>2</sup>		
United States.....	15	16	20	304	423	423	6,333	7,536	9,242
New England.....	0	0	0	14	23	24	759	929	926
Middle Atlantic.....	0	0	0	46	71	71	1,530	2,288	2,288
East North Central.....	3	1	7	55	43	51	2,023	1,627	2,416
West North Central.....	2	5	6	27	22	22	165	191	446
South Atlantic.....	1	0	0	35	83	120	643	913	966
East South Central.....	2	7	3	28	66	63	152	267	291
West South Central.....	1	2	2	56	71	90	565	426	426
Mountain.....	6	0	2	12	26	30	170	269	292
Pacific.....	0	1	1	31	18	27	326	646	801

<sup>1</sup> Mississippi and New York excluded; New York City included.

<sup>2</sup> Mississippi excluded.

## DISEASES ABOVE MEDIAN PREVALENCE

*Polio myelitis.*—The number of cases of poliomyelitis dropped from 5,488 during the 4 weeks ended October 5 to 3,298 during the current 4 weeks. However, each section of the country except the South Atlantic and East South Central still reported a relatively high incidence. For the country as a whole the number of cases (3,298) was 1.6 times the number reported for the corresponding period in 1945 and 2.1 times the 1941-45 median. Table 2 shows the total reported cases of poliomyelitis in geographic sections since the beginning of the year and the incidence by weeks since the week ended August 24 which was the first week to show a decline in the current epidemic. While the 1946 epidemic started in June in the South Atlantic section, the highest incidence was not reached in the North Atlantic sections until the latter part of September and early October. However, reports indicate that the peak has now been passed in all sections.

TABLE 2.—Number of cases of poliomyelitis reported in each geographic area during 1946, 1945, 1944 and 1943<sup>1</sup>

Geographic area	Total Jan. 1— Nov. 2	Week ended—										
		Aug. 24	Aug. 31	Sept. 7	Sept. 14	Sept. 21	Sept. 28	Oct. 5	Oct. 12	Oct. 19	Oct. 26	Nov. 2
All regions:												
1946.....	22,954	1,808	1,781	1,721	1,623	1,427	1,295	1,143	1,042	976	716	564
1945.....	15,572	931	917	891	965	864	774	639	549	617	489	390
1944.....	22,346	1,829	1,680	1,498	1,440	1,159	976	877	710	721	582	451
1943.....	14,411	872	956	908	1,020	818	679	515	498	438	363	259
New England:												
1946.....	753	41	37	41	57	42	65	67	71	70	54	37
1945.....	1,115	62	63	59	69	78	59	56	44	48	34	38
1944.....	931	74	75	64	49	71	38	41	38	50	26	19
1943.....	1,083	62	77	63	91	85	84	28	52	33	20	18
Middle Atlantic:												
1946.....	1,769	139	124	136	122	113	146	106	102	80	100	61
1945.....	4,337	344	295	236	330	213	207	155	127	146	96	67
1944.....	9,844	786	895	761	674	505	470	381	320	333	248	196
1943.....	1,188	57	72	83	91	83	67	63	50	46	36	23
East North Central:												
1946.....	5,402	422	542	483	472	441	365	338	300	292	209	173
1945.....	2,971	189	177	222	160	201	190	148	136	150	135	99
1944.....	3,955	271	321	255	329	236	174	167	142	113	84	90
1943.....	3,077	241	249	273	288	207	171	145	101	102	75	41
West North Central:												
1946.....	6,827	604	490	550	480	371	348	331	311	287	161	141
1945.....	1,331	49	97	83	122	69	82	70	69	68	61	57
1944.....	1,395	104	77	112	76	85	73	79	64	56	62	36
1943.....	1,900	131	183	138	148	114	88	80	67	38	36	24
South Atlantic:												
1946.....	1,184	63	52	55	53	38	39	36	30	50	33	23
1945.....	1,471	86	80	71	60	82	59	57	31	57	30	28
1944.....	3,283	214	205	187	169	149	114	96	88	102	95	56
1943.....	284	10	8	10	23	14	18	9	9	6	5	6
East South Central:												
1946.....	927	72	68	46	35	38	24	20	28	24	13	11
1945.....	815	37	30	39	23	33	27	29	33	30	36	20
1944.....	1,259	56	48	57	59	83	43	40	20	14	24	13
1943.....	254	20	14	12	9	6	10	4	6	3	9	2
West South Central:												
1946.....	1,949	103	76	102	79	81	69	59	47	55	37	28
1945.....	1,518	86	60	52	75	66	46	29	32	39	26	20
1944.....	509	11	14	17	15	13	14	13	7	9	12	10
1943.....	2,088	117	81	90	87	67	49	23	38	28	27	27

See footnote at end of table.



TABLE 2.—*Number of cases of poliomyelitis reported in each geographic area during 1946, 1945, 1944 and 1943*<sup>1</sup>—Continued

Geographic area	Total Jan. 1— Nov. 2	Week ended—										
		Aug. 24	Aug. 31	Sept. 7	Sept. 14	Sept. 21	Sept. 28	Oct. 5	Oct. 12	Oct. 19	Oct. 26	Nov. 2
Mountain:												
1946.....	1,587	126	131	122	115	121	79	52	44	28	33	28
1945.....	714	35	55	59	54	46	34	38	29	17	24	20
1944.....	252	16	12	15	18	21	12	8	5	8	1	3
1943.....	1,145	47	123	93	92	85	46	51	36	38	33	26
Pacific:												
1946.....	2,556	238	261	186	210	182	160	134	109	90	76	62
1945.....	1,300	43	60	70	72	76	70	57	48	62	47	41
1944.....	918	27	33	30	51	26	38	52	26	36	27	28
1943.....	3,392	187	149	144	191	157	146	112	136	144	122	92

<sup>1</sup> Similar tables for earlier weeks appeared in Public Health Reports for Sept. 6 and Oct. 4, 1946.

*Influenza.*—For the 4 weeks ended November 2 there were 5,759 cases of influenza reported; in 1945 there were 8,390 reported for the corresponding 4 weeks and the 1941–45 median was 5,543 cases. Of the total cases the South Atlantic section reported 1,150, and 3,850 were reported from the West South Central section; in the former section the incidence was below the median, but in the latter section the number of cases was about 30 percent above the preceding 5-year median. In other sections the incidence either closely approximated the median or fell considerably below it.

#### DISEASES BELOW MEDIAN PREVALENCE

*Diphtheria.*—The number of cases of diphtheria rose from 1,232 during the preceding 4 weeks to 1,463 during the 4 weeks ended November 2. The rate of increase was, however, somewhat lower than in preceding years and the number of cases during the current period was only about 50 percent of the number for the corresponding period in 1945 and less than 60 percent of the 1941–45 median. Prior to 1944 there had been a consistent decline in the incidence of this disease, but from October of that year until July 1946, inclusive, the number of cases for each 4-week period was higher than for the corresponding period in the preceding year, as well as higher than the preceding 5-year median for each period. Since July of 1946 the incidence has been relatively low, the number of cases reported during each 4-week period being lower than in the corresponding period of 1945, with the last two 4-week periods showing fewer cases than in any corresponding period in the 18 years for which these data are available.

An examination of diphtheria cases by geographic section shows a decline in each section of the country except the New England, Middle Atlantic and West North Central sections; in the North Atlantic

section the incidence was considerably above the median, but in the West North Central section the incidence was about the same as the median. This disease has been unusually prevalent in the South Atlantic and South Central regions and the relatively low incidence is largely due to important decreases in the number of cases reported from those sections.

*Measles*.—For the 4 weeks ended November 2 there were 4,052 cases of measles reported, as compared with 4,682 during the corresponding 4 weeks in 1945 and a 5-year (1941–45) median of 5,194 cases. The number of cases was higher than the median in the Atlantic Coast and West South Central sections, but in all other regions the incidence was relatively low.

*Meningococcus meningitis*.—The number of cases (265) of meningococcus meningitis reported during the current 4-week period was only 80 percent of the number reported for the corresponding weeks in 1945, which number (331 cases) also represented the 1941–45 median for this period. The numbers of cases in the South Central and Mountain regions were slightly above the median expectancy, but in all other sections the incidence was below the preceding 5-year median.

*Scarlet fever*.—The number of cases (5,754) of scarlet fever reported for the 4 weeks ended November 2 was the lowest reported for the corresponding period in the 18 years for which these data are available. For the corresponding weeks in 1945 there were 9,009 cases reported and the 1941–45 median for the same period was 8,970 cases. The incidence was relatively low in all sections of the country. In the New England, West North Central, South Atlantic, East South Central and West South Central sections the numbers of cases were approximately 50 percent of the 1941–45 median figures; in the Mountain and Pacific sections the incidence was less than 70 percent of the median; and in the Middle Atlantic and East North Central sections the numbers of cases were about 80 percent of the preceding 5-year medians.

*Smallpox*.—For the current 4-week period there were 15 cases of smallpox reported, as compared with 16 for the corresponding period in 1945 and a 5-year median of 20 cases. Six of the total cases occurred in the Mountain section where the 1941–45 median was 2 cases. In other sections where cases occurred the current incidence was below the preceding 5-year median.

*Typhoid and paratyphoid fever*.—The number of cases of these diseases was also the lowest in recent years. For the current 4 weeks the number of cases (304) was less than 75 percent of the 1941–45 median which was represented by the 1945 figure (423 cases). In the North Central and Pacific sections the current incidence was about

normal, but all other sections showed very considerable declines in the incidence of these diseases.

*Whooping cough.*—For the 4 weeks ended November 2 there were 6,333 cases of whooping cough reported. The current incidence was about 85 percent of the number of cases reported during the same weeks in 1945 and less than 70 percent of the 1941–45 median. The incidence was below the median in all sections of the country except the West South Central.

#### MORTALITY, ALL CAUSES

For the 4 weeks ended November 2 there were 34,683 deaths reported to the Bureau of the Census by 93 large cities. The average number of deaths reported for the same weeks in the years 1943–45 was 35,362. During the first week of the 4-week period the number of deaths was higher than the 3-year average, but in each of the 3 succeeding weeks the numbers were below the 1943–45 average.

### DEATHS DURING WEEK ENDED NOV. 2, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 2, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	8,616	9,023
Average for 3 prior years.....	8,919	-----
Total deaths, first 44 weeks of year.....	397,205	393,890
Deaths under 1 year of age.....	747	598
Average for 3 prior years.....	635	-----
Deaths under 1 year of age, first 44 weeks of year.....	28,928	26,696
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67,324,567	67,298,147
Number of death claims.....	11,189	12,302
Death claims per 1,000 policies in force, annual rate.....	8.7	9.5
Death claims per 1,000 policies, first 44 weeks of year, annual rate.....	9.5	10.1

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 9, 1946

#### Summary

A total of 489 cases of poliomyelitis was reported for the week, as compared with 564 last week and a 5-year (1941-45) median of 243. The decrease represents a decline of 13 percent, as compared with 21 percent for the preceding week and 30 percent for the corresponding week of 1944. Decreases occurred in all sections of the country except the South Central area. Of 23 States reporting 5 or more cases, 15 showed a decline (386 to 288), while 6 reported an increase (46 to 106). States reporting currently more than 10 cases each are as follows (last week's figures in parentheses): *Increases*—Indiana 20 (13), Missouri 31 (17), North Dakota 11 (5), Oklahoma 13 (3), Texas 26 (7); *decreases*—Massachusetts 14 (19), New York 31 (39), Ohio 15 (17), Illinois 49 (72), Michigan 27 (30), Wisconsin 31 (41), Minnesota 27 (32), Nebraska 14 (17), Kansas 15 (33), California 34 (41); *no change*—Pennsylvania 12, Iowa 29. The cumulative total to date is 23,427, as compared with 18,202 for the corresponding period in 1944 and a 5-year median of 11,622.

Since the approximate date of lowest seasonal incidence, the cumulative figures for certain diseases for the current year, the corresponding period of last year, and 5-year medians for the period, in the order stated, are as follows: Diphtheria 3,771, 6,459, 5,533; influenza 12,836, 17,700, 12,511; measles 9,698, 10,819, 11,571; meningococcus meningitis 735, 1,031, 1,031; poliomyelitis 22,961, 12,275, 11,320; scarlet fever 12,418, 19,362, 18,752; smallpox 39, 39, 54; typhoid and paratyphoid fever 3,203, 3,842, 4,405; whooping cough 5,225, 6,437, 6,923. Of these diseases current incidence above the median is reported for only influenza, poliomyelitis, and smallpox.

A total of 29 cases of tularemia was reported for the current week (3 in the Mountain and Pacific States, 15 in the midwestern States, and 11 in the eastern States), as compared with 9 last week and 8 for the corresponding week last year. The total to date is 813, as compared with 640 for the same period last year and an average of 649 for the period in the past 4 years.

Deaths registered during the week in 93 large cities of the United States totaled 8,663, as compared with 8,616 last week, 8,974 and 8,607, respectively, for the corresponding periods of 1945 and 1944, and a 3-year (1943-45) average of 8,732. The cumulative figure is 405,868, as compared with 402,864 for the same period last year.

*Telegraphic morbidity reports from State health officers for the week ended Nov. 9, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	Nov. 9, 1946	Nov. 10, 1945		Nov. 9, 1946	Nov. 10, 1945		Nov. 9, 1946	Nov. 10, 1945		Nov. 9, 1946	Nov. 10, 1945	
NEW ENGLAND												
Maine.....	*2	2	0	-----	-----	-----	127	-----	2	0	1	0
New Hampshire.....	0	3	0	-----	-----	-----	44	-----	12	0	0	0
Vermont.....	1	0	0	-----	-----	-----	32	-----	-----	0	0	0
Massachusetts.....	18	7	6	-----	-----	-----	135	198	166	3	3	3
Rhode Island.....	1	1	1	-----	-----	-----	2	-----	1	0	0	1
Connecticut.....	0	0	0	1	-----	1	16	9	12	2	1	3
MIDDLE ATLANTIC												
New York.....	16	10	16	12	12	12	156	80	116	3	16	17
New Jersey.....	7	2	4	4	5	4	27	9	18	3	3	3
Pennsylvania.....	17	7	9	1	3	2	159	374	207	5	11	11
EAST NORTH CENTRAL												
Ohio.....	17	27	19	3	6	6	80	8	27	4	3	3
Indiana.....	10	16	7	9	21	13	13	5	6	0	2	2
Illinois.....	8	9	11	1	1	9	8	150	36	2	12	8
Michigan <sup>1</sup> .....	6	11	11	-----	-----	1	16	112	93	2	4	4
Wisconsin.....	3	2	2	26	32	18	29	20	56	0	6	1
WEST NORTH CENTRAL												
Minnesota.....	12	9	9	-----	-----	-----	5	4	5	1	1	1
Iowa.....	6	20	6	-----	4	-----	3	2	18	1	0	0
Missouri.....	5	11	4	1	1	2	-----	10	5	3	0	0
North Dakota.....	4	8	3	-----	-----	-----	1	-----	2	0	1	0
South Dakota.....	0	3	3	-----	7	-----	2	2	2	0	1	0
Nebraska.....	2	9	4	-----	4	5	2	4	5	0	1	0
Kansas.....	6	1	2	1	1	-----	9	15	9	0	0	0
SOUTH ATLANTIC												
Delaware.....	1	0	0	-----	-----	-----	1	-----	1	0	1	1
Maryland <sup>2</sup> .....	9	14	11	4	1	1	9	3	9	1	0	3
District of Columbia.....	0	1	0	-----	2	2	-----	3	3	0	1	1
Virginia.....	15	31	28	282	159	159	78	5	7	3	1	2
West Virginia.....	3	7	7	15	64	9	13	-----	16	0	0	1
North Carolina.....	16	68	59	-----	-----	1	23	3	7	0	0	0
South Carolina.....	13	23	23	196	606	293	12	38	22	0	0	0
Georgia.....	9	36	26	19	7	19	30	8	8	3	1	0
Florida.....	16	2	5	7	3	3	-----	1	1	1	1	1
EAST SOUTH CENTRAL												
Kentucky.....	31	28	12	1	1	3	-----	74	13	1	4	4
Tennessee.....	23	19	18	20	26	22	24	-----	4	4	2	4
Alabama.....	7	18	28	27	21	27	4	1	2	1	3	1
Mississippi <sup>1</sup> .....	19	50	16	-----	-----	-----	-----	-----	0	3	-----	3
WEST SOUTH CENTRAL												
Arkansas.....	17	22	15	39	110	35	40	15	9	3	0	0
Louisiana.....	12	16	12	3	37	11	-----	1	1	0	0	1
Oklahoma.....	2	5	10	41	44	38	4	1	3	0	0	0
Texas.....	27	80	62	1,042	1,609	630	52	42	27	2	2	3
MOUNTAIN												
Montana.....	2	13	2	2	13	1	18	30	15	0	0	0
Idaho.....	0	4	1	4	18	-----	1	99	5	0	1	1
Wyoming.....	1	1	1	1	1	7	4	-----	2	1	0	0
Colorado.....	5	5	16	11	37	21	7	82	21	1	1	0
New Mexico.....	1	5	2	2	6	1	9	5	-----	0	0	0
Arizona.....	4	4	3	51	62	62	13	2	2	0	1	1
Utah <sup>2</sup> .....	0	0	0	-----	4	1	6	32	11	0	0	0
Nevada.....	0	0	0	-----	-----	-----	-----	-----	-----	0	0	0
PACIFIC												
Washington.....	5	11	5	-----	-----	-----	9	229	45	1	4	2
Oregon.....	2	0	2	12	1	7	25	11	25	0	0	0
California.....	24	24	24	6	12	14	72	223	135	7	12	11
Total.....	405	645	551	1,834	2,837	1,596	1,320	1,910	1,910	58	104	104
45 weeks.....	13,673	14,751	12,959	204,658	38,432	94,209	648,340	112,066	557,876	5,192	7,207	7,207

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

<sup>3</sup> Delayed reports: Maine, diphtheria 5 cases, included in cumulative total only.

Telegraphic morbidity reports from State health officers for the week ended Nov. 9, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>3</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Nov. 9, 1946	Nov. 10, 1945		Nov. 9, 1946	Nov. 10, 1945		Nov. 9, 1946	Nov. 10, 1945		Nov. 9, 1946	Nov. 10, 1945	
NEW ENGLAND												
Maine.....	0	0	0	37	11	11	0	0	0	2	2	1
New Hampshire.....	4	1	0	1	0	2	0	0	0	0	0	0
Vermont.....	2	1	0	1	10	9	0	0	0	0	0	0
Massachusetts.....	14	14	9	48	121	145	0	0	0	4	3	1
Rhode Island.....	2	0	0	8	4	8	0	0	0	0	0	0
Connecticut.....	5	5	1	17	21	23	0	0	0	1	2	1
MIDDLE ATLANTIC												
New York.....	31	34	34	159	228	224	0	0	0	4	14	7
New Jersey.....	4	9	9	46	49	62	0	0	0	2	0	1
Pennsylvania.....	12	19	6	91	175	153	0	0	0	0	6	6
EAST NORTH CENTRAL												
Ohio.....	15	7	7	205	227	223	0	0	0	3	4	4
Indiana.....	20	2	1	68	63	53	1	0	0	4	0	0
Illinois.....	49	31	15	98	139	155	0	0	1	1	2	2
Michigan.....	27	8	6	108	124	105	1	0	0	0	3	2
Wisconsin.....	31	53	7	51	68	115	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	27	10	10	28	44	49	0	0	0	0	1	1
Iowa.....	29	12	2	30	46	45	0	0	0	0	0	0
Missouri.....	31	5	3	30	37	39	0	0	0	4	1	2
North Dakota.....	11	0	0	1	7	7	0	0	0	0	0	0
South Dakota.....	7	0	0	2	4	12	0	0	0	0	0	0
Nebraska.....	14	6	3	7	14	15	0	0	0	0	0	0
Kansas.....	15	1	1	32	72	72	0	0	0	2	1	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	7	5	5	0	0	0	0	2	0
Maryland.....	4	0	0	15	48	48	0	0	0	0	2	0
District of Columbia.....	2	1	0	0	16	18	0	0	0	2	0	0
Virginia.....	1	3	3	30	124	76	0	0	0	1	1	1
West Virginia.....	1	0	1	37	84	84	0	0	0	1	0	1
North Carolina.....	4	2	1	24	80	92	0	0	0	0	2	2
South Carolina.....	0	0	0	3	13	13	0	1	0	1	3	3
Georgia.....	4	2	1	18	22	31	0	0	0	1	1	3
Florida.....	4	6	1	6	0	5	0	0	0	1	1	1
EAST SOUTH CENTRAL												
Kentucky.....	2	1	5	56	76	53	0	0	0	1	0	3
Tennessee.....	5	7	2	30	51	55	2	0	0	4	1	2
Alabama.....	2	1	2	10	32	32	0	0	0	0	4	2
Mississippi.....	4	2	2	15	41	20	0	0	0	4	1	1
WEST SOUTH CENTRAL												
Arkansas.....	5	2	2	7	18	13	0	0	0	2	6	6
Louisiana.....	4	4	0	3	12	12	0	0	0	4	4	4
Oklahoma.....	13	3	3	10	11	23	0	0	0	1	1	1
Texas.....	26	9	9	33	116	55	3	0	0	10	19	10
MOUNTAIN												
Montana.....	1	0	1	1	14	17	0	1	0	0	2	0
Idaho.....	3	2	1	18	7	8	0	0	0	2	0	0
Wyoming.....	1	0	0	2	0	6	0	0	0	0	0	0
Colorado.....	5	5	2	12	28	28	0	0	0	0	1	1
New Mexico.....	1	1	1	4	10	10	0	0	0	0	4	2
Arizona.....	0	1	0	5	6	6	0	0	0	3	0	1
Utah.....	2	2	3	16	24	12	0	0	0	1	0	0
Nevada.....	0	0	0	0	0	3	0	0	0	0	0	0
PACIFIC												
Washington.....	9	13	6	36	58	52	0	0	0	2	1	0
Oregon.....	2	1	1	19	18	22	0	0	0	2	1	1
California.....	34	44	17	99	248	152	0	0	0	6	5	3
Total.....	489	330	243	1,584	2,626	2,609	7	2	5	76	101	98
45 weeks.....	423,427	12,672	11,622	99,287	153,910	118,943	817	304	663	3,678	4,466	4,990

<sup>2</sup> Period ended earlier than Saturday.

<sup>3</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 2 (salmonella infection); Connecticut 1; New Jersey 1; Florida 1; Texas 3; Arizona 1; California 3.

<sup>4</sup> Delayed report: Arkansas, poliomyelitis, week ended August 17, 1 case, included in cumulative total only.

Telegraphic morbidity reports from State health officers for the week ended Nov. 9, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Nov. 9, 1946							
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever
	Nov. 9, 1946	Nov. 10, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	11	15	16	—	—	—	—	—	—	—	1
New Hampshire.....	—	9	3	—	—	—	—	—	—	—	—
Vermont.....	14	27	31	—	—	—	—	—	—	—	1
Massachusetts.....	141	168	168	1	—	—	1	—	—	—	2
Rhode Island.....	38	19	19	—	—	—	—	—	—	—	—
Connecticut.....	26	74	66	—	—	—	—	—	—	—	1
MIDDLE ATLANTIC											
New York.....	211	357	357	8	6	—	2	—	—	—	4
New Jersey.....	132	177	173	1	—	1	—	—	—	—	1
Pennsylvania.....	180	254	250	1	2	—	—	—	—	—	—
EAST NORTH CENTRAL											
Ohio.....	80	168	168	—	—	—	—	—	—	—	2
Indiana.....	37	26	21	1	—	—	3	—	1	—	7
Illinois.....	92	151	151	1	—	—	—	1	1	—	6
Michigan <sup>1</sup> .....	132	106	180	—	2	—	—	—	—	—	8
Wisconsin.....	184	61	143	—	—	—	1	—	—	—	8
WEST NORTH CENTRAL											
Minnesota.....	16	16	40	2	—	—	—	—	—	—	—
Iowa.....	18	11	18	—	—	—	—	—	—	—	25
Missouri.....	8	4	5	—	—	—	—	—	1	—	—
North Dakota.....	1	—	8	—	—	—	—	—	—	—	—
South Dakota.....	2	—	3	—	—	—	—	—	—	—	—
Nebraska.....	3	3	6	—	—	—	—	—	—	—	—
Kansas.....	3	17	17	—	—	—	—	—	3	—	23
SOUTH ATLANTIC											
Delaware.....	8	3	1	—	—	—	—	—	—	—	—
Maryland <sup>1</sup> .....	23	45	51	—	—	—	—	—	—	—	1
District of Columbia.....	15	6	6	—	—	—	—	—	—	—	—
Virginia.....	43	35	50	—	—	21	—	—	1	—	3
West Virginia.....	14	17	16	—	—	—	—	—	1	—	—
North Carolina.....	33	49	49	1	—	—	—	1	—	—	—
South Carolina.....	30	72	34	1	13	—	—	—	4	—	—
Georgia.....	—	11	18	1	2	—	—	—	—	17	1
Florida.....	26	2	16	1	—	—	—	—	—	6	1
EAST SOUTH CENTRAL											
Kentucky.....	19	113	88	—	—	—	—	—	—	—	—
Tennessee.....	25	14	15	1	1	2	1	—	2	2	7
Alabama.....	2	11	9	—	—	—	—	1	—	5	—
Mississippi <sup>1</sup> .....	—	—	—	—	—	—	—	—	3	3	7
WEST SOUTH CENTRAL											
Arkansas.....	21	12	16	1	—	—	—	—	7	1	1
Louisiana.....	1	1	4	—	—	—	—	—	—	1	—
Oklahoma.....	5	—	3	—	—	—	—	—	—	—	—
Texas.....	140	113	113	18	208	35	—	—	2	14	12
MOUNTAIN											
Montana.....	1	2	2	—	—	—	—	—	—	—	2
Idaho.....	2	12	4	—	2	—	—	—	—	—	—
Wyoming.....	3	3	3	—	—	—	—	—	—	—	—
Colorado.....	7	16	16	—	—	—	—	—	—	—	5
New Mexico.....	8	2	4	1	2	—	—	—	—	—	—
Arizona.....	17	6	14	—	—	8	—	—	—	—	2
Utah <sup>1</sup> .....	7	13	13	—	—	1	—	—	2	—	1
Nevada.....	—	4	—	—	—	—	—	—	—	—	—
PACIFIC											
Washington.....	25	26	26	—	—	—	—	—	—	—	—
Oregon.....	6	10	10	—	—	—	—	—	—	—	—
California.....	53	98	98	4	3	—	4	—	1	1	3
Total.....	1,863	2,369	2,367	44	301	68	12	3	20	51	125
Same week, 1945.....	2,359	—	—	51	319	95	10	4	8	196	80
Average, 1943-45.....	2,129	—	—	42	404	124	10	1	7	102	—
45 weeks: 1946.....	85,663	—	—	2,095	14,303	5,670	568	555	813	3,054	4,593
1945.....	109,239	—	—	1,714	22,298	9,725	574	460	640	4,481	4,138
Average, 1943-45.....	117,867	—	155,529	1,727	19,323	8,173	587	460	612	3,320	—

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-year median, 1941-45.

Anthrax: New York 1 case; New Jersey 1 case.

Leprosy: California 1 case.

WEEKLY REPORTS FROM CITIES<sup>1</sup>

City reports for week ended Nov. 2, 1946

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and city	Diphtheria cases	Erysipelas, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	1	0	0	1	6	0	0	6
New Hampshire:												
Concord.....	0	0	-----	0	7	0	0	1	1	0	0	-----
Vermont:												
Barre.....	0	0	-----	0	-----	0	0	0	1	0	0	2
Massachusetts:												
Boston.....	9	0	-----	0	11	1	10	7	12	0	0	21
Fall River.....	0	0	-----	0	-----	0	1	0	1	0	0	1
Springfield.....	0	0	-----	0	7	1	0	1	0	0	0	10
Worcester.....	0	0	-----	0	-----	0	7	4	3	0	0	14
Rhode Island:												
Providence.....	0	0	1	0	-----	0	1	0	3	0	0	14
Connecticut:												
Bridgeport.....	0	1	-----	0	1	0	1	0	0	0	0	1
Hartford.....	0	0	-----	0	2	0	0	0	1	0	0	2
New Haven.....	0	0	-----	0	4	0	0	0	2	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo.....	2	0	-----	0	-----	1	3	0	10	0	0	6
New York.....	3	1	7	0	23	5	41	27	39	0	4	60
Rochester.....	0	0	-----	0	14	0	2	0	8	0	0	3
Syracuse.....	0	0	-----	0	-----	0	1	2	7	0	0	11
New Jersey:												
Camden.....	0	0	-----	0	-----	0	2	0	1	0	0	3
Newark.....	1	0	-----	0	2	0	5	1	10	0	0	17
Trenton.....	0	0	-----	0	3	0	3	0	2	0	0	-----
Pennsylvania:												
Philadelphia.....	1	0	4	1	7	0	16	2	20	0	0	30
Pittsburgh.....	1	0	1	1	61	0	6	3	10	0	0	3
Reading.....	0	0	-----	0	1	0	0	0	0	0	0	16
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	3	0	-----	0	-----	0	2	34	21	0	0	2
Cleveland.....	3	0	-----	0	37	2	8	5	22	0	1	10
Columbus.....	2	0	-----	0	1	0	2	0	9	0	0	6
Indiana:												
Fort Wayne.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Indianapolis.....	0	0	-----	0	-----	1	4	3	8	0	0	5
South Bend.....	0	0	-----	0	1	0	0	0	1	0	0	-----
Terre Haute.....	0	0	-----	0	-----	0	2	1	0	0	0	-----
Illinois:												
Chicago.....	0	0	-----	0	2	1	20	20	22	0	0	51
Michigan:												
Detroit.....	2	0	-----	0	1	0	4	6	33	0	0	48
Flint.....	0	0	-----	0	1	0	6	0	3	0	0	2
Grand Rapids.....	0	0	-----	0	-----	0	2	0	0	0	0	4
Wisconsin:												
Kenosha.....	0	0	-----	0	-----	0	0	0	3	0	0	-----
Milwaukee.....	0	0	-----	0	6	0	1	5	9	0	0	74
Racine.....	0	0	-----	0	1	0	1	1	2	0	0	2
Superior.....	0	0	-----	0	-----	0	0	3	1	0	0	-----
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	-----	0	-----	0	0	4	1	0	0	1
Minneapolis.....	2	0	-----	0	2	0	5	2	5	0	0	-----
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	3	1	4	0	0	1
St. Joseph.....	0	0	-----	0	1	0	0	0	0	0	0	-----
St. Louis.....	3	0	-----	0	-----	1	11	7	4	0	3	5

<sup>1</sup> In some instances the figures include nonresident cases.



## City reports for week ended Nov. 2, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polio-myelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0	-----	0	-----	0	1	4	1	0	0	1
Kansas:												
Topeka.....	0	0	-----	0	-----	1	0	1	0	0	0	-----
Wichita.....	0	0	-----	0	-----	0	3	2	8	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	-----	0	1	0	3	0	0	-----
Maryland:												
Baltimore.....	5	0	-----	0	-----	4	0	4	10	0	1	25
Cumberland.....	0	0	-----	0	-----	5	0	0	0	0	0	-----
Frederick.....	0	0	-----	0	-----	4	0	0	0	0	0	-----
District of Columbia:												
Washington.....	4	0	-----	0	-----	6	0	4	9	0	0	5
Virginia:												
Richmond.....	0	0	-----	0	-----	18	0	2	1	0	0	2
Roanoke.....	1	0	-----	0	-----	0	1	0	1	0	0	-----
West Virginia:												
Charleston.....	0	0	-----	0	-----	0	0	0	3	0	0	-----
Wheeling.....	0	0	-----	0	-----	0	0	0	2	0	0	-----
North Carolina:												
Raleigh.....	0	0	-----	0	-----	0	2	0	0	0	0	2
Wilmington.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Winston-Salem.....	0	0	-----	0	-----	42	0	0	9	0	0	4
South Carolina:												
Charleston.....	1	0	15	0	-----	0	0	0	0	0	0	1
Georgia:												
Atlanta.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Brunswick.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Savannah.....	0	0	-----	0	-----	6	0	0	0	0	0	-----
Florida:												
Tampa.....	5	0	-----	0	-----	0	5	0	2	0	0	-----
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	1	0	-----	0	-----	1	0	3	4	0	1	6
Nashville.....	0	0	-----	0	-----	0	0	4	0	0	0	1
Alabama:												
Birmingham.....	1	0	3	2	1	0	4	0	0	0	1	-----
Mobile.....	0	0	-----	1	-----	0	0	0	1	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	-----	1	-----	0	0	1	1	0	0	-----
Louisiana:												
New Orleans.....	2	0	-----	0	-----	0	1	3	2	0	1	1
Shreveport.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Texas:												
Dallas.....	1	0	-----	1	-----	0	4	0	3	0	0	-----
Galveston.....	1	0	-----	0	-----	0	0	0	0	0	0	-----
Houston.....	2	0	-----	0	-----	0	4	4	2	0	0	1
San Antonio.....	1	0	-----	0	-----	0	6	1	0	0	0	-----
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Great Falls.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Helena.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Missoula.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Idaho:												
Boise.....	0	0	-----	0	-----	0	1	1	0	0	0	-----
Colorado:												
Denver.....	3	0	4	0	2	1	8	2	17	0	0	8
Pueblo.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Utah:												
Salt Lake City.....	0	0	-----	0	2	0	2	0	8	0	0	-----

## City reports for week ended Nov. 2, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomylitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	1	0	4	0	2	0	1	12
Spokane.....	0	0	-----	0	-----	0	3	7	0	0	0	-----
California:												
Los Angeles.....	7	0	6	0	4	1	1	7	17	0	0	6
Sacramento.....	0	0	-----	0	-----	0	1	0	0	0	1	-----
San Francisco.....	0	2	1	0	2	5	5	2	2	0	0	4
Total.....	72	4	42	7	301	20	255	188	399	0	14	516
Corresponding week, 1945.....	99	-----	55	7	377	-----	279	-----	628	0	15	684
Average, 1941-45.....	92	-----	71	2 18	398	-----	328	-----	635	0	19	760

\* 3-year average, 1943-45.

\* 5-year median, 1941-45.

Dysentery, amebic.—Cases: Buffalo 3; New York 1; Chicago 2; Los Angeles 1.

Dysentery, bacillary.—Cases: Worcester 2; New York 1; Chicago 1; Charleston, S. C., 1; Los Angeles 3; San Antonio 2.

Dysentery, unspecified.—Cases: San Antonio 11.

Typhemia.—Cases: Omaha 2.

Typhus fever, endemic.—Cases: Baltimore 2; Atlanta 1; Tampa 4; Nashville 1; Mobile 1; New Orleans 4; Houston 1; Los Angeles 2.

## Rates (annual basis) per 100,000 population by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 33,848,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis meningococcus, case rates	Pneumonia death rates	Polymyellitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	23.5	2.6	2.6	0.0	86	5.2	52.3	36.6	78	0.0	0.0	188
Middle Atlantic.....	6.0	0.5	5.6	0.0	54	2.8	36.8	16.2	50	0.0	1.9	69
East North Central.....	6.1	0.0	0.0	0.0	31	2.5	32.5	47.8	82	0.0	0.6	126
West North Central.....	11.3	0.0	0.0	0.0	9	2.3	54.1	45.1	56	0.0	9.8	23
South Atlantic.....	26.5	0.0	24.8	0.0	141	0.0	36.4	14.9	74	0.0	1.7	65
East South Central.....	11.8	0.0	17.7	17.7	12	0.0	64.9	23.6	24	0.0	11.8	41
West South Central.....	20.1	0.0	0.0	5.7	0	0.0	45.9	25.8	23	0.0	2.9	6
Mountain.....	23.8	0.0	31.8	0.0	32	7.9	127.1	23.8	199	0.0	0.0	79
Pacific.....	11.5	3.3	11.5	0.0	12	9.9	23.0	26.3	35	0.0	3.3	36
Total.....	11.1	0.6	6.5	1.1	46	3.1	39.4	29.0	62	0.0	2.2	80

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended October 19, 1946.*—During the week ended October 19, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		6		41	178	32	22	43	164	486
Diphtheria.....		2	4	32	16	9			1	64
Dysentery:										
Amebic.....					1					1
Bacillary.....					1					1
German measles.....				2	6		1	4	4	17
Influenza.....					16				6	22
Measles.....		4		58	38	28	55	49	33	265
Meningitis, meningococcus.....				1	2				1	4
Mumps.....				9	141	15	30	24	97	316
Polioomyelitis.....	8	4	5	48	35	1				101
Scarlet fever.....		16	6	69	63	13	1	3	10	181
Tuberculosis (all forms).....		18	5	117	52	19	10	4	30	255
Typhoid and paratyphoid fever.....				8	4			1	2	15
Veneral diseases:										
Gonorrhea.....	2	21	24	90	146	43	26	33	59	444
Syphilis.....		9	18	145	91	9	14	6	34	326
Whooping cough.....		11		21	48	3	1	3	7	94

### NORWAY

*Notifiable diseases—July 1946.*—During the month of July 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	13	Mumps.....	162
Diphtheria.....	278	Paratyphoid fever.....	4
Dysentery, unspecified.....	39	Pneumonia.....	379
Encephalitis, epidemic.....	2	Polioomyelitis.....	60
Erysipelas.....	353	Rheumatic fever.....	157
Gastroenteritis.....	4,285	Scabies.....	2,781
Gonorrhea.....	932	Scarlet fever.....	407
Hepatitis, epidemic.....	294	Syphilis.....	126
Impetigo contagiosa.....	3,141	Tuberculosis (all forms).....	380
Influenza.....	1,118	Typhoid fever.....	2
Malaria.....	1	Whooping cough.....	2,918
Measles.....	324		

# WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, UNRRA, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

## CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-August 1946	September 1946	October 1946—week ended—			
			5	12	19	26
ASIA						
Burma.....	0	1,254	20			
Bassein.....	0	29				
Moulmein.....	0	76				
Rangoon.....	0	23				
Ceylon.....	0	81	1		2	
China:						
Anhui Province.....	0	2,425	233			
Chekiang Province.....	0	3,580	731			
Formosa, Island of.....	0	1,556				
Fukien Province.....	0	1,032	140			
Foochow.....	0	645	40	14		
Honan Province.....	0	1,338	225			
Hopeh Province.....	0	273	19			
Hunan Province.....	0	1,330	497	13		
Hupeh Province.....	0	323	12			
Ichang Province.....	0	147				
Kiangsi Province.....	0	1,457	67	16		
Kiangsu Province.....	0	8,173	291			
Shanghai.....	0	4,388	171			
Kwangsi Province.....	0	897	19			
Kwangtung Province.....	0	4,289	216			
Canton.....	0	1,948	22			
Hong Kong.....	0	496	8	1		
Kweichow Province.....	0	8				
Macao, Island of.....	0		2			
Shantung Province.....	0	19	2			
Szechwan Province.....	0	111		3		
Yunnan Province.....	0	17				
India.....	0	58,672	4,461	810		
Calcutta.....	0	1,694	83	10	17	10
Chittagong.....	0	8				
Madras.....	0	3				
India (French).....	0	1				
Indochina (French):						
Cambodia.....	0	272				
Cochinchina.....	0	836				
Bien Hoa.....	0	24				
Chandok.....	0	21				
Mytho.....	0	142				
Saigon-Cholon.....	0	37				
Vinh-long.....	0	7				
Japan.....	0	990	206	2		
Korea (Chosen).....	0	11,351				
Malay States.....	0	234				
Manchuria.....	0	18,408	42			
Mongolia.....	0		16			
Siem (Thailand).....	0	3,314	82	93		
Bangkok.....	0	1,416	23	10	6	12
Straits Settlements: Singapore.....	0	41				

<sup>1</sup> For the period Oct. 1-10, 1946.

<sup>2</sup> Includes imported cases.

<sup>3</sup> From the beginning of the outbreak in April or May to approximately Sept. 1, 1946.

<sup>4</sup> Imported.

## PLAGUE

[O indicates cases; P, present]

Place	Janu- ary- August 1946	Septem- ber 1946	October 1946—week ended—			
			5	12	19	26
AFRICA						
Algeria.....	O	2				
Bechuanaland.....	O	10				
Belgian Congo.....	O	126	2	2		
British East Africa:						
Kenya.....	O	27	4	1		
Uganda.....	O	12				
Egypt.....	O	213	3			
Alexandria.....	O	125	1			
Ismailiya.....	O	27				
Matariya.....	O	12				
Port Said.....	O	16	2			
Suez.....	O	32				
Libya: Tripolitania—Plague-infected rats.....	O	1				
Madagascar.....	O	141	19			23
Union of South Africa.....	O	2				
ASIA						
Burma.....	O	1,102	9	13		
Bassein.....	O	22	1			
Rangoon.....	O	146		4	3	
China:						
Chekiang Province.....	O	568	102			
Formosa, Island of.....	O	9				
Fukien Province.....	O	4,343				
Amoy.....	O	307				
Foochow.....	O	1,385	14			
Kiangsi Province.....	O	257				
Kwantung Province.....	O	415				
Yunnan Province.....	O	200	76			
India.....	O	13,272	1,212	422		
Indochina (French): Cochinchina.....	O	48				
Java.....	O	32				
Manchuria.....	O	52				
Palestine.....	O	16				
Siam (Thailand).....	O	22	1			
EUROPE						
Great Britain: Malta, Island of.....	O	6				
Portugal: Azores.....	O	15				
NORTH AMERICA						
Canada, <sup>1</sup>						
SOUTH AMERICA						
Bolivia:						
Chuquisaca Department.....	O	1				
Santa Cruz Department.....	O	12				
Tarija Department—Plague-infected rats.....	P					
Brazil:						
Alagoas State.....	O	2				
Bahia State.....	O	20				
Ceara State.....	O	40				
Parahyba State.....	O	1				
Pernambuco State.....	O	34				
Ecuador:						
Chimborazo Province.....	O	2				
Loja Province.....	O	10	5			
Peru:						
Lambayeque Department.....	O	14				
Lima Department.....	O	19				
Piura Department.....	O	15				
Tumbes Department.....	O	1				
OCEANIA						
Hawaii Territory: Plague-infected rats.....		6				

<sup>1</sup> Includes 13 cases of pneumonic plague.<sup>2</sup> Pneumonic plague.<sup>3</sup> For the month of October 1946.<sup>4</sup> Includes 2 cases of pneumonic plague.<sup>5</sup> The imported suspected case previously reported has not been confirmed. Under date of Sept. 14, 1946, plague infection was reported in a pool of fleas from squirrels in Alaska and in a pool of fleas from squirrels in Superb, Saskatchewan.<sup>6</sup> Plague infection was also proved positive in Hawaii Territory on Feb. 5, 1946, in a pool of 29 rats, and on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice. Under date of July 3, 1946, plague infection was reported in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats. Under date of July 17, 1946, plague infection was reported in a pool of 48 fleas recovered from 22 rats, and in a pool of 66 fleas recovered from 33 rats. Under date of Sept. 12, 1946, plague infection was reported in a pool of 43 fleas recovered from 22 rodents. Under date of Oct. 9, 1946, plague infection was reported in a pool of 36 rats found on Sept. 10, 1946.

## SMALLPOX

[C indicates cases; P, present]

Place	Janu- ary- August 1946	Septem- ber 1946	October 1946—week ended—			
			5	12	19	26
AFRICA						
Algeria.....	O 236	10		15		
Basutoland.....	O 46					
Bechuanaland.....	O 11					
Belgian Congo.....	O 2,300	1611				
British East Africa:						
Kenya.....	O 723	56	15			
Nyasaland.....	O 318	90	9	23		60
Tanganyika.....	O 4,917	108				
Uganda.....	O 529	7	11			
Cameroon (French).....	O 68	1				
Dahomey.....	O 1,411	112		123		
Egypt.....	O 379	1				
Eritrea.....	O 2	21				
French Equatorial Africa.....	O 161					
French Guinea.....	O 821	31		14		
French West Africa: Dakar District.....	O 40					
Gambia.....	O 7					
Gold Coast.....	O 916	78				
Ivory Coast.....	O 1,161	158		117		
Liberia.....	P 40	40		47	57	
Libya.....	O 137	164				
Madagascar.....	O 1					
Mauritania.....	O 1					
Morocco (French).....	O 1,862	2		12		
Morocco (Int. Zone).....	O 175					
Morocco (Spanish).....	O 5					
Mozambique.....	O 4					
Nigeria.....	O 5,501					
Niger Territory.....	O 436	16		11		
Rhodesia:						
Northern.....	O 357	36		6		
Southern.....	O 4	5		1	1	
Senegal.....	O 95					
Sierra Leone.....	O 397	10				
Somaliland (Italian).....	O 1					
Sudan (Anglo-Egyptian).....	O 51	1			1	
Sudan (French).....	O 1,925	33		12		
Togo (French).....	O 213	19				
Tunisia.....	O 33					
Union of South Africa.....	O 204	P			P	
ASIA						
Arabia.....	O 1					
Burma.....	O 1,883	47				
Ceylon.....	O 347	11			192	
China.....	O 814	114	41	33	61	56
India.....	O 56,515	863	171			
India (French).....	O 3					
Indochina (French).....	O 1,640					
Iran.....	O 24					
Iraq.....	O 5	3				
Japan.....	O 17,647	9	2			
Malay States.....	O 528	85	37	4552	295	169
Palestine.....	O 2					
Rhodes, Island of.....	O 1					
Siam (Thailand).....	O 10,243	391		162		
Straits Settlements.....	O 51	17				
Syria and Lebanon.....	O 8					
Turkey (See Turkey in Europe).						
EUROPE						
Czechoslovakia.....	O 24					
France.....	O 15					
Germany.....	O 1					
Gibraltar.....	O 3					
Great Britain:						
England and Wales.....	O 753					
Malta, Island of.....	O 10					
Scotland.....	O 2					
Greece.....	O 114					
Italy.....	O 483					
Portugal.....	O 46					
Spain.....	O 5	2				
Turkey.....	O 16					
Yugoslavia.....	O 1					

See footnotes at end of table.

**SMALLPOX—Continued**  
[C indicates cases; P, present]

Place	Janu- ary- August 1946	Septem- ber 1946	October 1946—week ended—			
			5	12	19	26
NORTH AMERICA						
Canada.....	2					
Guatemala.....	55					
Honduras.....	4					
Mexico.....	371					
SOUTH AMERICA						
Argentina.....	68					
Bolivia.....	558	69				
Brazil.....	29		1	2		
Colombia.....	670	68				
Ecuador.....	47					
Paraguay.....	252					
Peru.....	408					
Uruguay.....	40					
Venezuela.....	832	26	22			
OCEANIA						
Hawaii Territory.....	1					

<sup>1</sup> For the period Oct. 1-10, 1946.<sup>2</sup> Includes alastim.<sup>3</sup> For 2 weeks.<sup>4</sup> Includes delayed reports.<sup>5</sup> Includes 1 imported case.<sup>6</sup> Imported.<sup>7</sup> Includes imported cases.<sup>8</sup> Off-shipping.**TYPHUS FEVER \***

<b>AFRICA</b>						
Algeria.....	C 712	46		15		
Basutoland.....	C 7					
Belgian Congo <sup>1</sup> .....	C 2,263	93				
British East Africa: Kenya <sup>2</sup> .....	C 21					
Egypt.....	C 1,330	16			8	
Eritrea.....	C 553	183	47	40	122	
French West Africa: Dakar District.....	C 7					
Libya.....	C 83					
Morocco (French).....	C 3,630	46		18		
Morocco (Int. Zone).....	C 53					
Morocco (Spanish).....	C 25					
Nigeria.....	C 26					
Rhodesia, Northern.....	C 1					
Sierra Leone <sup>3</sup> .....	C 3	2				
Tunisia <sup>4</sup> .....	C 183					
Union of South Africa <sup>5</sup> .....	C 225	P				
<b>ASIA</b>						
Arabia <sup>6</sup> .....	C 2					
Burma <sup>7</sup> .....	C 1	1				
China <sup>8</sup> .....	C 339	1				
India.....	C 293					
Indochina (French).....	C 61					
Iran.....	C 137					
Iraq.....	C 173	9	3	4		
Japan.....	C 30,659	67	12			
Malay States.....	C 3					
Palestine <sup>9</sup> .....	C 49					
Philippine Islands <sup>10</sup> .....	C 3					
Straits Settlements.....	C 1					
Syria and Lebanon.....	C 78					
Trans-Jordan.....	C 21					
Turkey. (See Turkey in Europe).						
<b>EUROPE</b>						
Albania.....	C 96					
Austria.....	C 34					
Belgium <sup>11</sup> .....	C 12	2				
Bulgaria.....	C 954	3				
Czechoslovakia <sup>12</sup> .....	C 785					
France <sup>13</sup> .....	C 15	1				
Germany.....	C 1,867					
Great Britain:						
England and Wales.....	C 1					
Malta and Gozo <sup>14</sup> .....	C 20	1				

\*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

For footnotes, see page 1755.

## TYPHUS FEVER—Continued

[O indicates cases]

Place	Janu- ary- August 1946	Septem- ber 1946	October 1946—week ended—			
			5	12	19	26
EUROPE—continued						
Greece <sup>1</sup> .....	O	385	132	10	11	
Hungary.....	O	819	29	11	34	15
Italy.....	O	16				
Netherlands <sup>2</sup> .....	O	24				
Poland.....	O	3,187	47	28	17	
Portugal.....	O	6	3			
Rumania.....	O	7,557	96			
Spain.....	O	16	10			
Canary Islands.....	O	2				
Sweden <sup>1</sup> .....	O	1				
Switzerland <sup>2</sup> .....	O	1		1		
Turkey.....	O	1,131	40	25	15	9
Yugoslavia.....	O	2,890				12
NORTH AMERICA						
Costa Rica <sup>1</sup> .....	O	61	4			
Cuba <sup>1</sup> .....	O	20				
Guatemala.....	O	580				
Jamaica <sup>1</sup> .....	O	31	4			1
Mexico.....	O	1,165				
Panama (Republic).....	O	2				
Puerto Rico <sup>1</sup> .....	O	80	6	2		
Virgin Islands <sup>1</sup> .....	O	3				
SOUTH AMERICA						
Argentina.....	O	5				
Bolivia.....	O	237	11			
Chile.....	O	380				
Colombia.....	O	295	69			
Curacao <sup>1</sup> .....	O	1				
Ecuador <sup>1</sup> .....	O	765	112			
Paraguay.....	O	1				
Peru.....	O	655				
Venezuela <sup>1</sup> .....	O	88	5			
OCEANIA						
Australia <sup>1</sup> .....	O	129	4			
Hawaii Territory <sup>1</sup> .....	O	36		4	7	4

<sup>1</sup> For the period Oct. 1-10, 1946.<sup>2</sup> Includes cases of murine type.<sup>3</sup> Murine type.

## YELLOW FEVER

[O indicates cases; D, deaths]

<b>AFRICA</b>							
Nigeria:							
Ibadan.....	O	1	—	—	—	—	—
Ilorin.....	O	1	—	—	—	—	—
Kafanchan.....	O	2	—	—	—	—	—
Ogbomosho.....	O	41	—	—	—	—	—
Sierra Leone: Freetown.....	O	1	—	—	—	—	—
<b>SOUTH AMERICA</b>							
Bolivia: Santa Cruz Department.....	D	140	—	—	—	—	—
Brazil: Para State.....	D	1	—	—	—	—	—
Colombia:							
Caquetá Territory.....	D	1	—	—	—	—	—
Magdalena Department.....	D	1	—	—	—	—	—
Santander Department.....	D	6	—	—	—	—	—
Peru: San Martín Department.....	D	3	—	—	—	—	—
Venezuela:							
Tachira State.....	O	4	—	—	—	—	—
Trujillo State.....	O	4	—	—	—	—	—
Zulia State.....	O	4	—	—	—	—	—

<sup>1</sup> Diagnosis confirmed in 14 cases and 10 deaths.





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**UNITED STATES PUBLIC HEALTH SERVICE**

**THOMAS PARRAN, *Surgeon General***

**DIVISION OF PUBLIC HEALTH METHODS**

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# Public Health Reports

**VOLUME 61      DECEMBER 20, 1946      NUMBER 51**

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# Public Health Reports

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of the Joint Committee on Printing

## THE SYMPTOMS OF THE PSYCHOPATH<sup>1</sup>

By HULSEY CASON, *Psychologist, United States Public Health Service*

The present study was carried out in the Psychopathic Unit, Medical Center for Federal Prisoners, Springfield, Mo. The Medical Center is the prison hospital for the 26 other institutions in the Federal Bureau of Prisons; the Psychopathic Unit is a 304-room unit designed for the care and study of various types of psychopathic patients.

The principal purpose of our study was to secure as accurate and as reliable data as possible on the outstanding symptoms of psychopathic personality. The results which we have obtained will be of practical value both in the understanding of the subject and in the diagnosis of the condition. The systematic procedure which was used shows that certain traits and characteristics are valid symptoms of the psychopath, but our investigation naturally does not show that these are all of the symptoms of the psychopath which can be found.

### THE RECORD SHEET

After some preliminary experimenting with 21 trial subjects, a record sheet was constructed for use in recording the individual results of each of the subjects. The 115 items in this record sheet are given in the first column of tables 1 and 2. These items are divided into three parts: (1) "personal data," (2) "forms of psychopathic behavior," and (3) "traits and characteristics of the psychopath." The "forms of psychopathic behavior" (part II) have been further divided into two groups: (a) "primitive modes of behavior," and (b) "illegal offenses and antisocial modes of behavior." Items 61-66 in part III refer specifically to the individual's psychopathic behavior.

An extensive study was made of the literature on psychopathic personality, and the items in the record sheet were selected on the basis of a very large number of articles and clinical studies. It has been claimed that each of the items 67-115 is a symptom of the psychopath, and it has sometimes also been assumed that some of the

<sup>1</sup> From the Bureau of Medical Services, Medical Center for Federal Prisoners, Springfield, Mo.

TABLE 1.—*Personal data*

	A	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Number of subjects.....	101	23	29	30	16	8	15	27	20	33	17	34	10	11	10	13
Part I. Personal Data <sup>1</sup>																
2. Age (median number of years).....	23.3	22.2	22.1	25.5	22.5	23.5	26.1	22.9	23.3	22.0	21.7	22.8	26.0	29.0	28.8	24.2
4. Race (percent):																
Colored.....	8	17	3	0	0	13	7	2	0	0	6	0	0	0	10	0
English.....	22	20	22	27	16	38	20	19	14	21	15	28	10	13	25	19
German.....	10	9	16	12	22	0	17	17	16	15	15	10	20	13	10	8
Irish.....	26	30	20	30	22	31	33	31	33	31	38	32	30	36	25	42
Scotch.....	8	11	2	12	6	13	13	9	7	6	9	7	15	18	5	8
5. Religion (percent):																
Protestant.....	46	52	34	55	38	63	53	38	31	36	35	29	50	82	70	62
Catholic.....	35	35	38	31	38	25	40	31	38	33	35	38	30	0	20	23
None.....	19	13	28	14	25	13	7	31	31	30	29	32	20	18	10	15
6. Principal residence during the past 15 years (percent):																
East.....	15	17	3	10	13	13	13	19	7	6	18	6	0	9	0	0
South.....	21	17	28	27	31	13	7	11	21	15	18	26	30	18	60	8
Middle West.....	20	26	28	23	25	13	53	22	34	30	12	21	30	27	10	31
South Central.....	22	26	31	27	19	38	7	33	21	30	41	20	20	36	20	31
West.....	8	9	7	3	6	13	13	7	7	9	6	9	0	0	0	8
7. Formal education (median grade):	8.4	8.6	8.2	8.3	7.7	8.2	9.9	8.9	8.6	7.9	8.6	8.3	8.2	9.0	8.5	7.9
8. Outside vocation (percent):																
Unskilled labor.....	17	17	28	13	0	13	7	19	10	6	24	12	20	18	20	23
Skilled labor.....	20	17	21	17	31	13	20	11	14	12	6	18	10	27	10	15
Farming.....	10	4	14	17	13	25	7	19	14	12	6	18	10	9	0	16
Miscellaneous.....	25	26	13	25	25	25	53	30	38	30	36	38	40	18	60	23
None.....	27	35	24	27	31	25	13	22	24	39	29	26	20	27	10	23
9. Marital history (percent):																
Married and not divorced.....	6	9	10	3	13	0	0	4	10	6	6	6	30	0	10	8
Married once and divorced.....	10	9	10	23	6	0	13	19	14	15	18	21	30	27	30	23
Married 2 or more times and divorced.....	9	13	3	3	6	26	14	4	10	3	12	6	6	27	12	0
Never married.....	75	70	76	70	75	75	73	74	66	76	65	68	70	45	40	69
10. Children (percent):																
No children.....	80	74	76	70	88	100	93	89	86	82	88	82	80	45	60	85
One child.....	16	17	21	20	13	0	7	7	14	18	12	9	20	45	30	15
Two or more children.....	4	9	3	10	0	0	0	4	0	0	0	9	0	9	10	0

11. Home and parents (percent):	16	13	14	13	13	27	15	7	15	12	12	20	9	20	15
Normal.....	16	22	10	23	25	20	15	14	18	12	12	30	27	10	8
Illegitimate, adopted, foster home.....	19	17	14	0	38	13	11	17	15	18	9	30	18	10	31
One or more parents criminal.....	35	39	41	40	33	27	26	31	33	35	35	27	18	30	31
Stepfather or stepmother.....	19	17	28	17	13	27	20	37	30	24	26	30	18	40	23
Antagonistic to father.....	19	17	21	13	25	20	37	17	21	29	24	20	9	20	31
Reared by various relatives.....	28	28	38	20	25	13	30	34	27	29	24	30	36	40	38
Inadequate supervision.....	22	17	31	17	13	27	22	31	15	29	18	20	0	10	23
Emotionally rejected.....															
11a. Emotional environment of home (weighted mean).....	-5	0	-9	-5	-9	+7	-1.0	-1.3	-1.0	-1.7	-1.4	-1.7	-5	-1.0	-1.6
12. Cultural level (weighted mean).....	-3	-2	-5	-3	-4	0	-4	0	-4	-6	-4	-9	+1	-1	-1.5
13. Early associates (weighted mean).....	+2	+6	-7	+3	-2	+1.3	-3	-2.2	-2.2	-9	-5	-1.0	+1.0	+2	-2
14. Age on leaving home (median).....	14.8	14.9	16.1	14.9	14.5	17.8	15.4	15.0	14.8	13.8	14.9	16.0	15.3	15.6	16.2
15. Age delinquency began (median).....	13.2	13.5	13.3	13.2	13.1	13.0	12.9	13.4	13.0	10.4	12.7	12.6	16.8	14.5	13.0
16. Military service (percent):															
In U. S. Army.....	48	39	24	57	63	87	52	34	33	41	29	60	45	20	46
Discharge from some.....															
Military service.....	48	43	28	70	50	87	52	38	33	35	35	60	55	30	31
No military service.....	45	52	59	23	38	13	41	52	55	36	36	30	36	70	46
17. Type of institution to which first committed (percent):															
Juvenile institution.....	50	48	59	43	56	27	52	41	55	65	56	70	36	60	46
Reformatory.....	22	17	21	23	19	13	26	31	21	24	29	10	27	20	38
Penitentiary.....	25	23	21	30	25	27	22	28	24	12	12	20	27	20	15
18. Number of convictions (median).....	2.7	2.2	3.4	3.5	3.0	1.1	3.3	3.3	2.8	5.0	4.6	3.0	4.6	3.8	2.7
19. Total number of years incarcerated (median).....	3.7	3.0	5.0	4.8	3.2	1.5	4.5	4.8	5.7	5.1	5.2	4.0	7.5	6.7	4.9
20. Current conviction (percent):															
Dyer Act.....	42	17	72	53	50	0	59	66	64	47	59	60	55	60	54
Sex morality.....	24	26	3	20	13	13	14	7	6	6	9	20	18	10	8
Other.....	35	56	24	26	37	14	26	26	30	48	33	20	27	30	39
21. Number of years of current sentence (median).....	3.7	3.2	3.7	3.1	3.5	3.4	4.2	3.8	3.9	4.2	4.6	4.5	3.4	2.9	3.4
22. Number of days good time lost (mean).....	93	87	138	60	94	27	85	141	130	144	135	60	91	15	96
23. Number of months left to serve on current sentence (median).....	12.4	9.4	11.8	10.6	10.0	10.2	15.5	12.1	9.2	15.8	12.0	22.5	17.5	10.0	13.7
24. With a detainer (percent).....	12	4	7	17	13	13	19	21	9	29	24	10	36	30	38
25. Custody (percent):															
Close.....	90	82	93	83	88	93	96	90	96	94	85	100	91	90	77
Medium.....	9	17	7	17	13	0	4	7	3	0	12	0	9	10	23
27. Principal work in prison (percent):															
Labor.....	28	36	41	33	31	0	26	38	27	29	26	30	36	30	31
General maintenance.....	13	14	7	10	13	13	7	21	12	12	12	20	18	10	16
Kitchen.....	12	5	10	27	25	13	22	13	12	12	12	30	9	0	8
Clerical.....	18	14	10	17	19	13	17	17	18	13	18	0	9	20	15
Other.....	25	32	31	13	13	51	25	24	30	30	27	20	27	40	31
28. Behavior record in prison (weighted mean).....	-5	+3	-1.9	-5	-1.1	+1.5	-1.2	-2.1	-2.5	-2.3	-1.5	-8	-1	+8	-1.5
29. Other diagnoses, physical handicaps, etc. <sup>1</sup>															

<sup>1</sup> Item 1, "subject number," item 3, "date," and item 26, "institutional residence," are omitted from original record sheet.

<sup>2</sup> Analyzed and distributed under groups "O" through "R," items 1-28.



TABLE 2.—*Scores on different items*

	B	C	D	E
	Individual- Results	Group- Judgment	Least Psy- chopathic	Most Psy- chopathic
Number of subjects.....	67	48	23	29
Part II. Forms of Psychopathic Behavior				
Primitive Modes of Behavior:				
Appetitive:	<i>Percentages</i>	<i>Percentages</i>	<i>Scores</i>	<i>Scores</i>
30. Predisposition to alcoholism.....	28	24	4	5
31. Predisposition to drug addiction.....	1	11	0	0
32. Sex.....	57	61	2	2
Egocentric:				
33. Egotism.....	57	39	1	11
34. Vanity and conceit.....	53	38	2	12
35. Selfishness.....	25	32	1	4
Bitter Emotional:				
36. Jealousy.....	51	37	4	7
37. Envy.....	29	42	2	5
38. Anger.....	65	50	4	15
39. Hate.....	51	37	3	13
Aggressive:				
40. Self-assertion.....	66	43	4	15
41. Domination.....	31	36	1	7
42. Quarrelsomeness.....	18	41	2	5
43. Pugnacity.....	48	42	4	11
44. Destructiveness.....	10	17	1	2
Inhumane:				
45. Meanness.....	28	26	1	6
46. Sadism.....	9	20	0	1
47. Cruelty.....	19	20	0	4
48. Ruthlessness.....	45	28	2	9
49. Brutality.....	3	13	0	1
50. Bestiality.....	1	9	0	0
Illegal Offenses and Antisocial Modes of Behavior:				
51. Against the person (homicide, assault, threat to do bodily harm).....	57	29	2	16
52. Property, gainful (burglary, forgery, larceny, robbery).....	75	54	13	19
53. Property, other (malicious mischief, trespassing).....	33	31	4	5
54. Sex morality (rape, crime against nature, prostitution, securing and transporting women for immoral purposes).....	55	47	3	4
55. Administration of government (escaping custody, falsely impersonating, resisting officer).....	57	34	7	11
56. Public health and safety (carrying concealed weapons, violating city ordinances, violating traffic laws).....	48	37	4	12
57. Sobriety and good order (disorderly conduct, drunkenness, vagrancy).....	60	48	7	13
58. Public policy (gambling, violating liquor laws).....	22	24	2	6
59. Children and prisoner's family (contributing to delinquency).....	18	22	0	4
60. Miscellaneous (delinquency, violating parole, violating United States postal laws).....	81	35	9	14
Part III. Traits and Characteristics of the Psychopath				
In regard to his psychopathic behavior:				
61. Impulsive rather than deliberate.....	70	50	7	11
62. Anomalous or self-thwarting.....	90	47	10	17
63. Poor insight into.....	70	54	7	17
64. Rationalizes.....	48	58	4	10
65. Not easily improved by punishment.....	78	58	8	16
66. Responsible for most of.....	90	65	9	1
Attitude and rationalization:				
67. Strongly disliked the authority of one or both of his parents.....	61	35	8	17
68. Antagonistic towards authority.....	60	61	8	11
69. Does not care.....	64	44	8	17
70. Tendency to blame others for most of his troubles.....	45	39	5	1
71. Suspicious.....	54	49	6	1
72. Censorious rather than compassionate.....	49	46	4	1
73. Feelings of revenge.....	49	46	4	1
74. Tendency to smooth over his past difficulties.....	63	48	8	1
Judgment and wisdom:				
75. Poor judgment and common sense.....	84	45	9	1

TABLE 2.—*Scores on different items—Continued*

	B	C	D	E
	Individual-Results	Group-Judgment	Least Psychopathic	Most Psychopathic
Number of subjects.....	67	48	23	29
Part III. Traits and Characteristics of the Psychopath—Continued				
In regard to his psychopathic behavior—Con.	<i>Percentages</i>	<i>Percentages</i>	<i>Scores</i>	<i>Scores</i>
76. Easily influenced.....	42	58	7	5
77. Hasty decisions.....	69	57	7	13
78. Ineffective consideration of consequences.....	78	51	9	16
79. Short term values.....	60	64	6	8
80. Insufficient social valuation.....	66	43	6	14
81. Intolerant.....	30	50	0	10
82. Somewhat fanatical.....	10	22	0	4
Other cognitive functions:				
83. Changeable philosophy of life.....	60	34	9	12
84. Lack of fixity of purpose.....	49	42	6	11
85. Deductive rather than inductive.....	56	40	3	12
86. Argumentative.....	37	51	5	6
87. Poor sense of humor.....	25	27	2	5
88. Ganser's symptom.....	10	27	1	1
Affective functions:				
89. Feelings of inferiority-superiority.....	66	47	7	8
90. Capacity for affection and object-love.....	31	53	6	12
91. Undisguised and outwardly directed emotional reactions.....	63	57	4	8
92. Explosive.....	57	35	3	12
93. Anxiety.....	66	34	10	7
94. Dulling of some feelings, emotions, and sentiments.....	30	28	6	4
95. Unappreciative.....	25	42	1	4
96. Easily bored.....	40	47	6	7
Morality and integrity:				
97. Poor sense of fairness and justice.....	51	41	4	12
98. Poor sense of duty and obligation.....	55	47	5	11
99. Untruthful.....	36	57	4	10
100. Not concerned over interests and welfare of other people.....	49	49	6	12
Conflict and conscience:				
101. Poor conscience.....	48	42	3	11
102. Little sense of guilt.....	52	47	5	12
103. Has not given much thought to the problem of moral control.....	51	49	5	11
Outside adjustment:				
104. Poor adjustment.....	73	46	13	16
105. Poor school adjustment.....	45	46	7	9
106. Unstable vocationally.....	63	48	9	14
107. Migratory tendency.....	57	42	8	11
Miscellaneous:				
108. Extraverted.....	46	56	3	17
109. Unsportsmanlike.....	0	31	1	0
110. Impatient.....	72	54	6	12
111. Nervous.....	55	38	8	7
112. Exhibitionistic.....	31	41	2	4
113. Noisy and boisterous.....	35	40	2	8
114. Makes threats.....	34	34	1	9
115. Has never made a serious attempt at suicide.....	85	84	9	8

items on "personal data" (1-29) and some of the "forms of psychopathic behavior" (items 30-60) are symptoms of the psychopath.

In the case of each subject, an attempt was made to obtain as accurate and reliable information as possible on each of the 115 items. The answers to the "personal data" (items 1-29) were recorded in spaces provided for this purpose in a prepared form. In parts II and III (items 30-115), the item was checked if it applied to or was true of the subject. Some account was taken of the subject's own opinion, as well as the opinions of his more critical relatives, friends, and acquaintances. The item was double-checked if it was

strong, outstanding, or important in the life of the subject. The item was questioned when there seemed to be a reasonable doubt. If there was positive evidence that the item did not apply to, or was not true of, the subject, the item was not marked in any way.

The marks which were used had a somewhat different meaning in the case of "illegal offenses and antisocial modes of behavior" (items 51-60). Several specific offenses are listed under each of these items. If the subject had committed only one of the specific offenses under item 51 (homicide, assault, etc.), for example, this item was checked once; and if he had committed two or more of these specific offenses, this item was checked twice. These check marks were based on the specific offenses which the subject had actually committed and for which he could have been arrested regardless of whether or not he had been suspected, accused, arrested, tried, or convicted in connection with the specific offense in question.

Items 61-66 were checked only on the basis of the particular "forms of psychopathic behavior" (items 30-60) which had just been found to be present in each individual subject.

A record was also made of several other details which are not shown in the accompanying tables. The I. Q.'s of a few individuals of borderline intelligence were recorded under item 7. For those subjects who had been in some kind of military service, the type of discharge was noted in connection with item 16. Under item 29 a record was made of some of the more important medical diagnoses, a history of syphilis, a history of serious head injury, any psychotic or neurotic symptoms, etc. In connection with item 32, "sex," a note was made of whether the subject was normal, bisexual, active homosexual, passive homosexual, or mixed homosexual.

#### PROCEDURE WITH INDIVIDUAL SUBJECTS

The following detailed procedure was used in the case of each individual subject:

- (1) A careful study was made of the subject's central file record, and about one-third of the items could usually be filled in or checked in this way. The author attempted to form as accurate an impression as possible of the life history and personality characteristics of the subject.

- (2) The subject was interviewed immediately after his central file record had been studied. The general purpose of the study was explained, and special emphasis was placed on the fact that the primary interest was in having all of the data as accurate as possible.

- (3) The subject was reminded of the fact that the author was not connected in any way with the administration of the institution, and he was assured that all of his answers would be off the record. An

attempt was made to be understanding, uncritical, and not surprised or shocked at anything. The subjects were urged not to try to make a good or a poor impression; and they told a great many things about themselves which were very much against them and which were not in their official records. The cooperation of the subjects, while not all that could be desired in a few cases, was much more frank and honest than could be obtained by the average official or professional employee.

(4) During the interview, the subject had a blank copy of the record sheet in front of him so that he could follow the different items. The items were taken in order, all of the questions were asked orally, and all of the answers, grades, and marks were recorded. An attempt was made to phrase each question as clearly and as unambiguously as possible. Some of the questions were somewhat personal, and a few questions required a considerable amount of explanation.

(5) With most of the subjects, 3 or 4 hours were generally required to carry out all of the details of the procedure, but it was frequently not possible to obtain the individual results from a single subject in the time which was available in a morning or afternoon.

#### SUBJECTS

The inmates of the Psychopathic Unit were given an opportunity to volunteer as subjects, and more subjects volunteered than could be used. No persons were used as subjects who could not understand English, or who were feeble-minded, clearly psychotic, or acutely ill. Complete results were obtained on 101 subjects, ranging in age from 17 to 35 years.

After the detailed results had been obtained by the individual procedure described above, several groups of subjects were formed. The data on these groups are given in tables 1 through 4.

All of the subjects in group C (table 2) are also included in group B. In the five groups D, E, G, H, and I, no subject in any one group is included in any one of the four other groups. None of the homosexual subjects (G, H, and I) is included in the "least psychopathic" (D) or the "most psychopathic" (E) groups. The same subject is frequently included in more than one group in the case of groups F and J to R. The manner of selecting subjects for groups B and C will be described below in connection with table 2. Excluding the homosexual subjects (G, H, and I), group D is made up of those who had been given the smallest number of check marks on the "forms of psychopathic behavior" (table 2, part II, items 30-60), and group E is made up of those subjects who had been given the largest number. Group F includes all of the subjects for whom alcohol had been a definite habit or problem, and who were checked on item 30, "predisposition to

TABLE 3.—Results for different groups of subjects

	A	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Number of symp- toms
Number of subjects.....	101	23	29	30	10	8	15	27	29	33	17	34	10	11	10	13	
Part II. Forms of Psychopathic Behavior																	
Primitive Modes of Behavior:																	
Appetitive:																	
30. Predisposition to alcoholism.....	(5)	3.5	5	[16]	8	0	2	5	4	5	4	6	7	8	6	8	0
31. Predisposition to drug addiction.....	(0)	2.4	0	1	0	4	0	0	0	1	0	1	1	1	2	1	0
32. Sex.....	(8)	2.4	2	(9)	[14]	[16]	[18]	(8)	7	7	(8)	(8)	(9)	5	(9)	(9)	7
Egoistic:																	
33-34. Egotism, vanity, and conceit.....	(8)	2.2	12	8	7	10	6	[16]	12	11	15	11	10	9	7	9	10
35. Selfishness.....	(3)	1.3	4	3	3	3	2	[9]	3	4	8	4	4	6	2	3	2
Bitter emotional:																	
36. Jealousy.....	(7)	4.1	7	8	5	12	10	7	[11]	8	7	8	5	7	7	6	1
37. Envy.....	(3)	2.4	5	4	3	4	3	6	[9]	2	4	3	5	4	3	6	0
38. Anger.....	(9)	4.1	15	10	12	9	4	12	[17]	15	14	12	12	8	8	12	8
39. Hate.....	(7)	2.6	13	6	8	5	3	11	[16]	12	12	11	11	6	7	9	8
Aggressive:																	
40. Self-assertion.....	(9)	4.3	15	10	9	11	4	14	14	[17]	15	12	12	11	8	11	4
41. Domination.....	(4)	1.3	7	4	3	4	1	7	7	[9]	6	5	4	4	2	2	0
42. Pugnacity.....	(7)	3.9	11	6	8	6	3	8	11	[14]	12	11	6	1	4	6	1
Inhumane:																	
45. Meanness.....	(3)	.9	6	3	5	3	1	7	5	0	[18]	7	0	4	3	2	0
46. Cruelty.....	(2)	0	4	2	3	3	1	5	4	4	[15]	5	4	3	1	2	0
47. Ruthlessness.....	(5)	2.0	9	4	7	8	1	9	8	9	[15]	9	6	7	3	9	7
Illegal Offenses and Antisocial Modes of Behavior:																	
51. Against the person.....	(8)	1.7	16	8	9	6	3	12	13	[12]	16	[16]	12	6	7	7	7
52. Property, gainful.....	(16)	13.0	19	18	16	16	0	17	19	19	[19]	[19]	16	16	15	10	0
53. Property, other.....	(4)	3.6	5	2	3	3	1	7	6	6	8	[17]	7	7	8	7	0
54. Sex morality.....	(6)	3.0	4	7	[8]	[10]	[13]	10	11	12	14	[14]	11	10	11	9	0
55. Administration of government.....	(8)	7.9	11	8	11	6	4	10	11	12	13	[13]	10	5	8	8	1
56. Public health and safety.....	(7)	7.3	12	8	13	8	1	11	9	10	12	[14]	10	13	11	12	0
57. Sobriety and good order.....	(10)	7.0	13	[18]	14	8	6	11	11	11	12	[14]	16	13	5	3	1
58. Public policy.....	(4)	2.2	6	5	4	4	0	5	4	6	5	[17]	5	3	5	3	1

59. Children and prisoner's family	(2)	9.4	4	2	1	2	4	3	3	5	[5]	3	2	2	0
60. Miscellaneous	(12)	9.1	14	11	14	7	13	14	13	14	[16]	14	12	13	0
Part III. Traits and Characteristics of the Psychopath															
Attitude:															
68. Antagonistic towards authority	(11)	7.8	16	10	12	7	13	16	17	17	15	16	10	10	0
81. Intolerance	(4)	0	10	4	3	1	1	7	9	7	7	7	3	5	2
72. Feelings of revenge	(8)	2.9	13	7	9	5	8	13	11	13	12	14	6	11	5
Cognitive Functions:															
84. Lack of clarity of purpose	(8)	6.1	11	7	10	4	5	7	11	12	10	11	7	6	0
78. Ineffective consideration of consequences	(12)	8.5	15	12	16	6	13	15	16	17	16	15	14	12	0
85. Deductive rather than inductive	(7)	3.0	12	5	6	5	12	12	12	9	10	11	6	6	7
Moral Senses:															
101. Poor conscience	(7)	2.0	11	7	10	8	1	12	10	16	12	11	6	7	8
97. Poor sense of fairness and justice	(8)	3.5	12	8	9	13	1	11	11	14	12	11	8	9	8
100. Not concerned over interests and welfare of other people	(9)	5.7	12	10	10	8	5	12	14	12	15	13	8	7	0
Miscellaneous:															
108. Unstable vocationally	(10)	8.7	14	13	13	9	5	14	13	12	17	14	13	12	0
114. Makes threats	(5)	9	9	5	5	3	3	7	10	9	10	11	3	4	6
61. Impulsive psychopathic behavior	(11)	7.2	13	13	11	13	6	12	15	15	14	14	14	10	0
68. Poor insight into his psychopathic behavior	(10)	6.7	14	10	12	9	3	12	13	14	15	13	13	0	0
64. Rationalizes his psychopathic behavior	(6)	3.9	10	8	9	9	1	8	9	9	9	6	8	6	0
Average (omitting scores in brackets)															
Median (omitting scores in brackets)	6.9	4.0	10.0	7.2	8.0	7.1	3.5	9.2	9.7	9.5	11.1	9.7	7.2	6.9	7.8
Number of symptoms	7.1	3.5	11.0	7.3	8.4	7.5	3.3	9.1	10.7	10.3	12.3	10.4	7.3	7.0	7.7
			12	3	4	5	0	9	9	9	14	10	1	1	5
															98

1 Scores in group D, printed in bold face, used as standard of comparison for all other groups of subjects, E to R.  
 2 Scores in brackets are those where the particular item was the basis employed in selecting subjects for that particular group.  
 3 Scores of item 82, sex, in parentheses, are nonsynonymous and are not used further.  
 4 Scores in groups E to R, printed in bold face, represent items regarded as symptomatic of that group of subjects.

alcoholism." Subjects were included in groups G, H, or I if they were bisexual, active homosexual, or passive homosexual, respectively.

Subjects were selected for the five groups J to N on the basis of the slightly revised list of "forms of psychopathic behavior" shown in part II (items 30-60) of table 3. An individual was included in group J, "egocentric," if he had been given a total of at least two checkmarks on the two items, counting the single and double checkmarks, and he was included in group K, "bitter emotional," if he had been given at least four checkmarks on the four items, etc.

Individuals were included in the groups of subjects with "psychotic symptoms" (O), "neurotic symptoms" (P), a "history of syphilis" (Q), or a "history of serious head injury" (R), on the basis of notes made in connection with item 29, "other diagnoses," on the original record sheet. A serious head injury was one which had had an appreciable influence on the personality and behavior of the subject.

In tables 1, 2, and 3, the items of the record sheet and the sub-items are listed in the first column, and the results for the different groups of subjects are given in the following columns. In these three tables, the numbers accompanying the items correspond with the numbers given in the original record sheet for the different items, and the letters at the top of the columns are given for ease in reference.

#### PERSONAL DATA

A considerable amount of detailed information on "personal data" (items 1-29) was collected on all of the subjects, and these results are given in table 1. In this table, the statistical measure used for each item is indicated in parentheses following the name of the item.

The median age (item 2) of all of the subjects (column A) was 23.3 years. The principal races or nationalities represented (item 4) were Irish, English, and German. About three-tenths of the "most psychopathic," "egocentric," "bitter emotional," "aggressive," "inhumane," and "criminal" subjects professed no religion (item 5). The median school grade reached by all of the subjects was 8.4. One-fourth of all of the subjects had had no outside vocation. One out of every 17 of all of the subjects was married and not divorced, and three-fourths of the subjects had never been married. One-sixth had had a normal home, one-third had had a stepfather or stepmother, one-fifth were antagonistic to their fathers, and one-fifth had been emotionally rejected by their parents (items 7, 8, 9, 11, 11a).

In the case of items 11a, 13, and 28, the four ratings of "good," "fair," "poor," and "very poor" on the original record sheet were for statistical purposes given respective values of +3, +1, -1, and -3; in the case of item 12, the five ratings of "superior," "comfortable," "average," "marginal," and "submarginal" were given respective

values of +2, +1, 0, -1, and -2; and the weighted means (table 1) were calculated on the basis of these numerical values. The weighted mean for the emotional environment of the home (item 11a) was -0.5 for all of the subjects. In early associates (item 13), the score for the "least psychopathic" subjects was better than the score for the "most psychopathic" subjects.

The median age on leaving home (item 14) for all of the subjects was 14.8 years; the "inhumane" subjects left home the earliest, and the "passive homosexuals," the latest. The median age at which delinquency began (item 15) was 13.2 years for all of the subjects, and delinquency began earliest in the case of the "inhumane" subjects. For all of the subjects, one-half had been dishonorably discharged from some kind of military service, one-half had been first committed to a juvenile institution, the median number of convictions was 2.7, and the median number of years incarcerated was 3.7 (items 16-19). The Dyer Act was the most common current basis for conviction for all of the subjects, and was the basis much more frequently for the "most psychopathic" subjects than for the "least psychopathic" subjects. For all of the subjects, the median number of years of the current sentence was 3.7, the mean number of days good time lost was 93, the median number of months left to serve on the current sentence was 12.4, one-tenth had a detainer, and nine-tenths were in close custody (items 21-25). The behavior record in prison (item 28) was much worse for the "most psychopathic" than for the "least psychopathic" subjects.

A careful examination of table 1 will show that many of these results are relatively more favorable for the "passive homosexual" subjects.

The most important finding in these results, even if it is a rather surprising one, is that most of these items of "personal data" are not reliably different for the "most psychopathic" and "least psychopathic" subjects, and most of these items are therefore of little or no value in the differential diagnosis of the psychopath.

A study of the results in table 1 will show that the items in this table which are the most symptomatic of the psychopath are the following:

11a. Poor emotional environment of home.

13. Poor early associates.

28. Poor behavior record in prison.

The results for these three items are much more unfavorable for the "most psychopathic" than for the "least psychopathic" subjects. These results are also relatively unfavorable for the "egocentric," "bitter emotional," "aggressive," "inhumane," "criminal," "psychotic," and "head injury" groups; and relatively favorable for the



"passive homosexual" and "neurotic" groups, and subjects with a "history of syphilis."

#### SCORES ON DIFFERENT ITEMS

In order to determine which of the items in parts II and III are most symptomatic of the psychopath, we have given in table 2 the results on items 30-115 for four groups of subjects, B, C, D, and E. In table 2 the values given in columns B and C are percentages, and the values given in columns D and E are scores.

The procedure used in calculating the percentages given in column B, "individual results," was as follows. The 67 subjects in this group included all of the more intelligent subjects who had been in the Psychopathic Unit for more than a few weeks. For each of items 30-115 we calculated the percentage of subjects (out of a total of 67) for whom each item had been checked once or twice; and these percentages are given in column B. In this individual-results calculation, item 30, "predisposition to alcoholism," for example, was checked for 28 percent of the 67 subjects.

The procedure used in obtaining the percentages given in column C, "group judgment," was as follows:

(1) A list of the 67 subjects included in group B was mimeographed; and the name, number, and residence of each subject was given on the mimeographed sheet.

(2) As many as possible of the 67 inmates in group B were assembled, and each of the subjects present was given a copy of the mimeographed list of subjects and a copy of the original record sheet, with which he was already familiar.

(3) Each subject present checked the name of each of the 67 inmate subjects whom he either knew or knew a good deal about, omitting his own name.

(4) Each subject was asked to consider only the inmates whose names he had just checked. For each of the items 30-115, the subject then estimated the number of inmate subjects out of every 10 to whom the item applied or for whom the item was true. If, for example, one of the subjects present knew 50 of the inmates included in the group, and if he estimated that 25 of these 50 inmates were prone to anger (item 38), then the estimate of this subject for this item was 5.

(5) In this procedure, the items were taken one at a time, and whenever it seemed desirable the author explained the meaning of the item just before it was judged by the subjects.

A total of 48 subjects took part in this group-judgment procedure. The judgments of the subjects ranged from 0 to 10. The mean of these judgments was calculated for each of the items, and these

means were changed into percentages. These percentages are given in column C of table 2. According to the group judgment of the 48 subjects, for example, 61 percent of all of the subjects are sexual deviates (item 32), and 50 percent are prone to anger (item 38).

The values in columns B and C give an approximate but significant comparison between B, the percentage of times each of these items was checked in the individual procedure which we used, and C, the percentage of times the group of 48 subjects thought that each of these items should have been checked. In the procedure which we used, 28 percent of the group of 67 subjects were checked on item 30, for example, and the C group of 48 subjects thought that 24 percent of the subjects should have been checked on this item. An examination of the pairs of B and C percentages will show that both percentages are sometimes high, in several cases both are low, and in some cases the two percentages differ considerably from each other. The correlation between the B and C percentages is  $+0.62$ .

Many of the items 30-115 are not flattering to the subjects; and it seems probable that the individual procedure which we used may have been faulty or limited especially in the case of those items where the C percentage was considerably higher than the B percentage.

The procedure used in calculating the scores in table 2 for the "least psychopathic" (D) and "most psychopathic" (E) subjects was as follows. In the individual procedure with each subject, each item was checked, double-checked, questioned, or left blank; and for statistical purposes these marks and grades were given values of 1, 2,  $\frac{1}{2}$ , and 0, respectively. Using these values, a mean score was calculated for each item and for each of the two groups of subjects D and E; and this mean score was multiplied by 10 to avoid fractions. The theoretical range of these mean scores is from 0 to 20, and a high score indicates that the item was strong or prominent for the group in question.

Each of the items 30-115 in table 2 was considered to be symptomatic of the psychopath if it met the following criteria:

- (1) The score for the "most psychopathic" subjects (E) should be much higher than the score for the "least psychopathic" subjects (D).
- (2) The B and C percentages should be at least moderately high.
- (3) The B and C percentages should not indicate that there was too large an error in the results obtained by our individual procedure.

Item 39, prone to hate, for example, is symptomatic of the psychopath because the score of 13 for the "most psychopathic" subjects is much higher than the score of 3 for the "least psychopathic" subjects, and both the B and C percentages are moderately high. Item 44, however, is not symptomatic of the psychopath because the D and E scores are about the same.

Proceeding in this detailed fashion, we have used the results of table 2 in making a careful revision of items 30-115. We have made a few changes in the "forms of psychopathic behavior" (items 30-60), and have radically shortened the list of alleged "traits and characteristics of the psychopath" (61-115). All of these changes may be seen by making a detailed comparison between the items of table 2, which we have just discussed, and the items of table 3, which will be described in the following section.

#### RESULTS FOR DIFFERENT GROUPS OF SUBJECTS

The results on the revised and shortened list of items for all of the groups of subjects except B and C are summarized in table 3. The results for groups D and E are repeated in this table for comparative purposes. The procedure used in calculating the scores in table 3, with the exception of the last column and the last three rows, was the same as that described in the preceding section for groups D and E. The theoretical range of the scores in the body of the table is from 0 to 20, and the higher the score the more prominent the item. In part III of table 3, the "traits and characteristics of the psychopath" which have been retained have been regrouped.

The scores for the "least psychopathic" (D) subjects are the standard of comparison for all of the other groups of subjects E to R. These D scores are carried out to one decimal place, and they are printed in bold face. The scores for the "least psychopathic" (D) and "most psychopathic" (E) subjects are the most important results in the table. The scores for "all subjects" (A) are of value only in giving some additional information on the whole group of 101 subjects.

It may seem that we have given too much prominence to the sexual deviates by dividing these subjects into three groups, G, H, and I, but it would have been misleading to have included all of the sexual deviates in a single group.

The subjects in the "alcoholic" (F) group were selected on the basis of the check marks for item 30, "predisposition to alcoholism"; and the score of 15 for group F, item 30, has been set off in brackets in table 3. All of the scores in table 3 have been set off in brackets where particular "items" were the basis employed in selecting subjects for "groups of subjects"; and these scores in brackets are not used in judging the value of different items as symptoms of different groups of subjects.

In order to determine which of the items given in the first column of the table are symptomatic of the groups of subjects shown in the top row of the table, each of the scores for groups E to R has been compared with the corresponding standard score for the "least

psychopathic" (D) subjects. After taking various statistical matters into consideration, we adopted the criteria that a given item will be regarded as symptomatic of a group of subjects if the score in question (1) is at least three times the standard D score, and (2) has a magnitude of at least eight.

The score of 15 for group E, item 38, for example, meets the criteria because the score of 15 is at least three times the standard D score of 4.0, and the score of 15 also has a magnitude of at least eight. All of the scores for groups E to R in table 3 which meet these criteria, and which indicate that certain items are symptomatic of certain groups of subjects, have been printed in bold face.

There are 546 scores for groups E to R in the body of table 3, counting the scores in brackets; and the median of these scores is 8.4. There are 93 scores which indicate that an item is symptomatic of one of the groups of subjects E to R. The total number of items which are symptomatic of each of the groups of subjects E to R is shown in the last row of the table, "number of symptoms"; and the total number of the groups of subjects E to R for which each of the items is a symptom is shown in the last column of the table, "number of symptoms."

In the third and second to the last rows of table 3, we have given the average and median values for each group of subjects, omitting the scores set off in brackets. These values are based on the original scores which were carried out to one decimal place.

From a knowledge of the inmates included in the "most psychopathic" (E) and "least psychopathic" (D) groups of subjects, and in view of the systematic procedure used, it is certain that the individuals included in group E were psychopaths and that the individuals included in group D were not psychopaths. In table 3, the results for the E and D subjects show that 12 of the items are valid symptoms of the psychopath; and a comparison of the results for the 13 groups of subjects F to R with the results for the "most psychopathic" (E) subjects will show the extent to which each of the 13 groups F to R has the general symptoms of the psychopath.

There is a limitation in the results for item 32, "sex," and for the three groups of sexual deviates (G, H, and I) which is due to the policy of selecting criminal and psychopathic sexual deviates for transfer to the Psychopathic Unit, and to our procedure in forming the different groups of subjects from a common pool. Because of these factors of selection, and inasmuch as subjects included in the three groups of sexual deviates (G, H, and I) were sometimes also included in groups F and J to R, the scores in table 3 which seem to indicate that item 32, "sex," is a symptom of some of the groups of subjects, do not have

the meaning which they appear to have. For this reason, the apparently symptomatic scores of item 32, "sex," have been placed in parentheses, and these scores will not be considered further.

In spite of the factors of selection which have just been mentioned, the "bisexual" (G) subjects, in comparison with group E, have only four of the symptoms of the psychopath, the "active homosexuals" (H) have only three, and the "passive homosexuals" (I) have none. The "active homosexuals" (H) also show in our results two symptoms which are not prominent symptoms of the psychopath: item 36, "jealousy," and item 58, "offense against public policy." The central tendencies of the scores, shown at the end of table 3, are slightly lower for the "passive homosexuals" (I) than for the "least psychopathic" (D) subjects.

These results show that the three groups of homosexual subjects do not have the outstanding symptoms of the psychopath. The same is also true of the "alcoholic" (F) subjects, who have only two of the prominent symptoms of the psychopath.

The results, however, are quite different for the next 6 groups of subjects, J to O. The outstanding symptoms of each of these groups correspond in a striking fashion with the outstanding symptoms of the psychopath, and the scores for these 6 groups of subjects show that there is a considerable amount of consistency in our results. The "egocentric" (J) subjects have all of the 12 outstanding symptoms of the psychopath (E, table 3) except 3: "intolerant," "feelings of revenge," and "makes threats"; but the scores for these 3 symptoms come very close to meeting the criteria which we adopted for outstanding symptoms. The "bitter emotional" (K) subjects have all of the outstanding symptoms of the psychopath (E) except one, "intolerant"; and the score for this symptom comes very close to meeting the criteria for outstanding symptoms. Similar results were obtained for the "aggressive" (L) and "inhumane" (M) subjects. The central tendencies of the scores, shown at the end of table 3, are higher for the "inhumane" (M) subjects than for the "most psychopathic" (E) subjects. From the point of view of criminology and penology, it is also interesting that the "criminal" (N) group of subjects have all of the symptoms of the psychopath except two: "self-assertion," and "intolerant"; but the scores for these two symptoms almost meet the criteria of symptoms. The subjects with "psychotic symptoms" (O) have all of the symptoms of the psychopath except three: "self-assertion," "ruthlessness," and "intolerant"; and the scores for these three symptoms also come very close to meeting the criteria of symptoms. The "egocentric" (J), "bitter emotional" (K), "aggressive" (L), and "criminal" (N) subjects do not show in our results any symptoms which are not also symptoms of the psychopath.

Item 81, "intolerant," is the symptom of the psychopath for which the scores of groups J to O most frequently approximated, but did not quite reach, the criteria of symptoms. For this item, a score of 8 would have met the criterion, and the respective scores obtained for groups J to O were 7, 7, 9, 7, 7, 7.

The results of the last three groups of subjects P, Q, and R are quite different from the results of the six groups of subjects J to O which have just been described. The subjects with "neurotic symptoms" (P) have only one of the prominent symptoms of the psychopath: "egotism, vanity, and conceit." It may be noted that as far as these results and these symptoms are concerned, the subjects with "psychotic symptoms" (O) are similar to psychopaths, but the subjects with "neurotic symptoms" (P) are not similar to psychopaths. The subjects with a "history of syphilis" (Q) do not have any of the prominent symptoms of the psychopath. The subjects with a "history of a serious head injury" (R) have four of the prominent symptoms of the psychopath: "egotism, vanity, and conceit"; "anger"; "hate"; and "ruthlessness"; but several of the other scores for these head injury cases almost meet the criteria of symptoms.

#### CORRELATIONS BETWEEN THE SCORES OF DIFFERENT GROUPS OF SUBJECTS

In order to secure some further information on the similarities and differences which exist between the scores for different groups of subjects as shown in table 3, we have calculated coefficients of correlation between (1) the scores of each of the 15 groups of subjects D to R, and (2) the scores of each of the 14 remaining groups of subjects. In calculating these coefficients of correlation between the paired scores in the body of table 3, we have used the original scores which were carried out to one decimal place.

The 105 intercorrelations between the scores of the different groups of subjects D to R are given in table 4. The range of these correlations is from +.40 to +.93, the mean of these correlations is +.73, and the median is +.74.

In the preceding section special attention was called to the similarities between the highest scores and symptoms of the "most psychopathic" (E) subjects, on the one hand, and on the other hand the highest scores and symptoms of six other groups of subjects: "ego-centric," "bitter emotional," "aggressive," "inhumane," "criminal," and subjects with "psychotic symptoms." The intercorrelations between the scores of these seven groups of subjects (E, J, K, L, M, N, and O) have been set in italics in table 4. Eighteen of the 105 correlations in the whole table have a value of +.85 or above, and 11 of these 18 correlations are italicized. The mean of the 84 correla-

TABLE 4.—Correlations between the scores of different groups of subjects<sup>1</sup>

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	Least psychopathic	Most psychopathic	Alcoholic	Bisexual	Active homosexual	Passive homosexual	Egocentric	Bitter emotional	Aggressive	Inhumane	Criminal	Psychotic symptoms	Neurotic symptoms	History of syphilis	History of serious head injury
D. Least psychopathic															
E. Most psychopathic															
F. Alcoholic															
G. Bisexual															
H. Active homosexual															
I. Passive homosexual															
J. Egocentric															
K. Bitter emotional															
L. Aggressive															
M. Inhumane															
N. Criminal															
O. Psychotic symptoms															
P. Neurotic symptoms															
Q. History of syphilis															
R. History of serious head injury															

<sup>1</sup> Scores in italics represent intercorrelations between groups E, J, K, L, M, N, O.

tions not italicized is  $+.71$ , and the mean of the 21 correlations which are italicized is  $+.84$ .

The relationship between the scores for the different groups of subjects D to R in table 3 has also been tested further by a simple statistical method. We have expressed each of the scores for these groups of subjects as a plus or minus deviation from the average of the group of subjects shown at the end of table 3, and have calculated the percentage of like-signed pairs for each of the 105 pairs of scores. The percentage of like-signed pairs support in an even more striking manner the conclusions which have been reached in the preceding section in regard to the resemblances between the scores and symptoms of psychopaths and the scores and symptoms of the six groups of subjects J to O.

#### THE SYMPTOMS OF THE PSYCHOPATH

In the present study we have secured negative as well as positive results on a number of alleged traits and characteristics of the psychopath. Although the principal emphasis has been on positive findings, an examination of tables 1 and 2 will show that reliable negative results were also obtained on a number of items. The following are some examples of items which in our results were found not to be symptomatic or diagnostic of psychopathic personality:

- 9. Marital history.
- 14. Age on leaving home.
- 15. Age delinquency began.
- 17. Type of institution to which first committed.
- 70. Tendency to blame others for one's troubles.
- 76. Easily influenced.
- 79. Short term values.
- 86. Argumentative.
- 90. Incapacity for affection and object-love.
- 93. Anxiety symptom.
- 96. Easily bored.
- 111. Nervous symptom.
- 115. No serious attempt at suicide.

The positive results which show that certain traits are valid symptoms of the psychopath have already been discussed in connection with tables 1, 2, and 3; and in describing the results of tables 2 and 3, some criteria of selection were used in order to call special attention to the most prominent individual symptoms. The criteria of selection, however, are arbitrary, and all of the results differ in degree. There is positive evidence that several of the items are symptoms of the psychopath, even though the scores do not fully meet the criteria, and some of these positive items are closely related in meaning.



In view of the quantitative and relative nature of the results, we have made a further detailed study of the positive items, and have carefully considered the amount of overlapping and similarity in meaning between all of the positive items. Proceeding in this way, we have selected and phrased what appear to be the best symptoms of the psychopath; and these symptoms are given in table 5. An attempt has been made to phrase these symptoms in such a way that there will be as little overlapping in meaning as possible, and the 20 symptoms have been grouped for convenience in 5 groups. The results of our study indicate that each of these symptoms is a valid symptom of the psychopath.

TABLE 5.—*The symptoms of the psychopath*

History:	Cognition—Continued
1. Poor emotional environment of early home	11. Poor insight
2. Poor early associates	12. Paranoid tendency
3. History of poor behavior	Affection:
4. History of antisocial conduct	13. Prone to anger
Morals:	14. Prone to hate
5. Poor moral sense	15. Hostile
6. Poor sense of fairness and justice	16. Mean or ruthless
7. Poor conscience	Conation:
8. Not concerned over interests and welfare of other people	17. Self-assertion
Cognition:	18. Impulsive
9. Egocentric	19. Anomalous and self-thwarting behavior
10. Deductive rather than inductive	20. Threatening or pugnacious

In diagnosing a given person as a case of psychopathic personality, it is desirable to have in mind a clear concept of the general nature of this condition, but this is the subject of a separate paper which is being published currently. It may be remarked, however, that the symptoms of the psychopath in table 5 are human and natural and practically coincide with the forms of behavior which the leaders of the great world religions have urged man to attempt to control. According to our concept, psychopathic behavior is primitive and antisocial, and a psychopath is a person who has a serious lack of ability to control several of these primitive antisocial modes of behavior.

In addition to having in mind a clear concept of the psychopath, a concrete list of symptoms will be of practical value. In judging the extent to which a given person is psychopathic, account should be taken of the strength and prominence of the symptoms, as well as the number of different symptoms. Some psychopaths have all of these symptoms, and other psychopaths have a smaller number of these symptoms but in a more pronounced form. It would seem that for a person not to have any of these symptoms even to a mild degree, it would be practically necessary for him to be a saint. The great majority of the population, with their different patterns and groupings of a limited number of symptoms, fall somewhere between

the psychopath and the saint. It will be practical and convenient to diagnose an individual as a case of psychopathic personality if he has a reasonable number of these symptoms in a fairly pronounced form.

## GASTROENTERITIS ABOARD SHIP<sup>1</sup>

### COMMON TYPES ENCOUNTERED, AND THE PREVENTION AND CONTROL OF OUTBREAKS

By WILLIAM A. MEYERS, *Commander (MC), United States Naval Reserve*

During 1945, a number of major outbreaks of "gastroenteritis" aboard ships in the Pacific Ocean Area were investigated. Several hundred ships of all types were also routinely inspected to check on general ship sanitation and on many minor outbreaks of food infection or food poisoning. From this experience the following high lights are presented.

#### COMMON TYPES OF OUTBREAKS ENCOUNTERED

The major epidemics of gastroenteritis which were investigated were attributable in approximately equal numbers to (1) *Shigella*, (2) *Salmonella*, and (3) "unknown cause" (probably a virus). Food intoxication due to *Staphylococci* was also probably fairly common, but since these outbreaks were usually mild and of short duration, very few were investigated. For this reason, it was not possible to estimate the frequency with which outbreaks of staphylococcal etiology occurred in proportion to "dysentery types" of gastroenteritis.

Outbreaks involving from 20 to 1,400 persons each were caused by *Shigella* of five different types. These were *Shigella flexneri* I, II, III, and VIII, and *Shigella alcalescens*. *S. flexneri* III was the most common type. There were two fatalities from these outbreaks. One ship was put out of service for 60 days, and many others were immobilized for shorter periods. The sources of infection were food-handler carriers on board, contaminated food eaten ashore, and convalescent carriers or cases transferred from a ship on which there was a current outbreak. The use of polluted sea water in the vegetable peelers was responsible for at least two of these outbreaks, resulting in a total of 500 cases, two deaths, and the loss of the services of two ships for a total period of 3 months. The foods eaten before an outbreak and subsequently discovered to have been contaminated were most frequently found to be meats and vegetable salads. Most types of *Shigella* dysentery were successfully treated with one of the sulfonamides in ordinary doses. However, a number of these organ-

<sup>1</sup> Condensed from BUMED NEWS LETTER, vol. 7, No. 12, June 12, 1946, by permission of the Navy Department.

isms exhibited sulfonamide resistance within a wide range, including even different strains of the same *S. flexneri* type of bacteria.

Outbreaks involving from 10 to 250 persons each were caused by *Salmonella* of more than ten different species. The symptoms were generally milder than in those outbreaks due to *Shigella*. The common foods infected were turkey, chicken, and salmon. Turkey was by far the most common offender. *Salmonella* were found to be relatively sulfaresistant.

In the examination of specimens of water from storage tanks of various ships, excessively high plate counts have been found in many of the samples. These counts revealed about 1,000 bacteria per cubic centimeter and were indicative of contamination of a serious degree. Chlorination of the ship's fresh water should be unhesitatingly recommended when contamination is suspected.

#### PREVENTIVE MEASURES

An educational program and thorough daily inspections by a medical officer familiar with the usual modes of disease dissemination will prevent the majority of these outbreaks. Most outbreaks were found to be due to improper handling of food, insanitary galley conditions, or a combination of these circumstances, all of which might well have been rectified by careful medical supervision. Inspections should be made at different times of the day so that all procedures carried on in the galley and other food-handling compartments can be carefully checked. Such routine inspections may be delegated to a hospital corps officer or corpsman, if necessary, but the medical officer himself should also frequently make the inspection.

Personnel and equipment concerned with milk and ice cream mixing should be as carefully checked as those in the galley. The proper cleaning of equipment and the handling of milk products requires a careful and detailed technique. Several outbreaks of streptococcal pharyngitis have been observed on ships due to lack of refrigeration of reconstituted milk for periods of 12 hours or more. In one such instance in which 45 percent of the ship's company became ill, the mess cook who prepared the milk mixture had a draining streptococcal abscessed tooth. One-third of these patients developed scarlatiniform rashes. A staphylococcic food poisoning due to infected ice cream was also investigated. The improper cleaning of equipment was the probable cause of this outbreak.

When the supply of fresh water permits, salt water should not be used in the galley or other food-preparation spaces for any purpose at any time. When it is not possible to do away completely with the use of sea water, it must be made certain that it is not used in any food-preparation spaces for any purpose whatsoever when in a harbor

or fleet anchorage, or when tied up alongside another ship. It must be kept in mind that after leaving a harbor or fleet anchorage, etc., the salt-water lines will contain contaminated water until they have been thoroughly flushed by uncontaminated open-sea water. *The use of contaminated salt water was the chief sanitary defect found aboard the ships studied.* The contaminated water used in vegetable peelers was undoubtedly the cause of two serious dysentery outbreaks. In one instance, the sea water was contaminated by one acute case aboard, and in the other, by a ship tied alongside. The use of contaminated salt water to scrub decks has been prohibited. It is believed that the only way to guard against the hazard of using contaminated salt water is permanently to disconnect all salt-water lines to the galley, vegetable peelers, etc.

The great majority of outbreaks of gastroenteritis are preventable by proper supervision. The most common points overlooked have been found to be:

1. Failure of routine inspection of hands (with especial attention to fingernails) of food handlers and the prompt removal of ill food handlers from duty.
2. Use of contaminated sea water in the vegetable peelers and on the decks of the galley, butcher shop, vegetable-preparation room, etc.
3. Improper technique of handling cooked fowl.
4. Holding food at galley temperatures too long.
5. Absence of soap from heads (latrines), and inadequate cleansing of hands of those involved in preparation and serving of foods.

#### CONTROL OF OUTBREAKS

When an outbreak of gastroenteritis occurs aboard ship, the cause should be established and brought under control as soon as possible. This can usually be accomplished by taking a history of each case. The use of previously prepared 4 x 5 cards for this purpose is recommended. The important points to be noted are: time of onset, symptoms, division of ship's company to which attached, and food eaten (all food eaten within the past 24 hours, or at least which meals were eaten in the previous 48 hours). It may be necessary to get a more detailed history when the cause is narrowed to one or two meals or foods.

The symptoms, incubation time, etc., should suggest a diagnosis of (1) chemical or staphylococcal toxin food poisoning, or (2) food infection due to *Shigella* or *Salmonella*. The incubation time of the first group is usually from  $\frac{1}{2}$  to 5 hours, and of the second, usually from 12 to 72 hours. Those ill due to the first group (food poisoning) tend to have more nausea and vomiting, but less fever, than those ill due to food infection. Outbreaks due to a "virus" infection are

not explosive in character. When the responsible food is found, its preparation and handling should be carefully checked to determine the mechanisms of the outbreak.

A diagnosis of the type of infection or poisoning should be made, if possible, because control procedures differ, depending on the etiology. Food-poisoning outbreaks (staphylococcic enterotoxin or chemical) are most often self-limited. When the cause of the poisoning has been determined, measures to prevent continuance or recurrence should be instituted. Gastroenteritis caused by food infection is frequently not self-limited, and active control measures must be taken immediately. Food-handler carriers are the most frequent source of infection. This being the case, one carrier may start an epidemic, infecting more food handlers who may become carriers either as active clinical cases or as asymptomatic cases. Experience has shown that from 10 to 35 percent of asymptomatic food handlers have rectal cultures positive for *Shigella* organisms as long as 2 months after the original outbreak. *Salmonella* were not found in as high a percentage of food handlers, but many of these asymptomatic food handlers had a positive culture 1 month or more after the onset of the original outbreak.

If facilities for culturing stools are not available, all food handlers may be given sulfadiazine, and any among them with gastrointestinal symptoms should be relieved of duty associated with the preparation and serving of food. Food handlers should be instructed in all the rules and methods of galley sanitation and personal hygiene, and these procedures should be enforced. Food-handler personnel should be inspected daily for signs and symptoms of illness.

Scrub brushes for the hands should be provided and a bucket of a disinfectant (lysol or cresol solution) should be placed at the door of each head (latrine). A guard should be posted to see that everyone thoroughly washes his hands and dips them in the bucket before leaving. This guard can also be of great help in making all men who have diarrhea report to the sick bay. The guard on watch in the head used by food handlers should be particularly reliable. In a widespread outbreak of bacillary dysentery aboard many ships of the Third Fleet which were investigated, many of the cases were undoubtedly due to direct or indirect contact with patients.

If stool cultures of patients are negative for enteric pathogens, and the outbreak is evidently not due to a chemical poison or staphylococcal toxin, a virus should be suspected. In such cases, the possibility of contact transmission, as in respiratory disease, should also be considered.

Drinking water should always be checked bacteriologically if possible, even though it has been found to be an unusual source of infection.

When an outbreak of respiratory illness occurs on a ship, all patients should be isolated if practicable. Bunks should be checked to see that the men sleep head to foot whenever possible. If the outbreak is explosive in character, food, especially milk, must be suspected. Proper methods of mixing and refrigerating milk should be enforced.

#### SUMMARY

In summary, the steps to be taken in case of an outbreak of gastroenteritis are as follows:

1. Obtain a history of each case as outlined above, and isolate the patient if possible.
2. Inspect the galley as outlined above, and determine the technique used in preparing all foods under suspicion. Obtain a record of menus as actually served during the previous 3 days. Have a daily "field day" in all food-handling compartments as long as the epidemic lasts.
3. Obtain samples of suspected foods.
4. Examine all food handlers daily for skin lesions, and signs and symptoms of present or recent illness. Use a complete and up-to-date personnel check-off list to be sure all handlers are examined. Remove all questionable men from this duty.
5. Give a short talk to all hands regarding the importance of personal hygiene and the modes of transmitting enteric diseases, including transmission by carriers. The food handlers should be given special additional instructions.
6. Arrange for a 24-hour "head watch" and employ hand brushes and disinfectant as outlined previously.
7. Check on the use of contaminated salt water on decks and anywhere in spaces used for food preparation and handling.
8. Particularly warn all hands and boat crews of the danger of contamination with polluted sea water while in and around the boats.
9. Give all food handlers prophylactic sulfadiazine, 1 gram three times a day for 5 days, if stool cultures cannot be made. Check on the source and handling of milk supply.
10. Chlorinate all fresh-water tanks to a strength of two parts per million. Investigate the source of the water supply. Check for the possibility of cross connections with salt-water lines, etc.
11. To prevent spread, do not transfer men ashore or to other ships except for treatment.
12. Report outbreak to line and medical officers (and to other higher authority if indicated) as directed, as soon as possible.
13. Obtain the assistance of an Epidemiological Unit, if available.

14. If a virus is suspected as the etiological agent, measures for the control of respiratory illnesses should also be instituted as follows:

- a. Isolate all patients if possible.
- b. Ascertain the habits and the duties of the patients who first show the illness, and determine the locations aboard ship (division, bunking compartment, etc.) or special group, etc. in which the illness may have originated and in which new cases may be expected to occur.
- c. Inspect the ship as outlined above for insanitary and unhygienic conditions, and have them corrected.
- d. Check "head to foot" bunking arrangements and ventilation of bunking spaces.
- e. Check particularly the health of milk handlers and the methods used to mix and refrigerate milk and ice cream.
- f. Give a short talk to all hands on the prevention of respiratory illnesses.
- g. Do not transfer men ashore or to other ships unless necessary.

If the service of an Epidemiological Unit is available during or after an outbreak of any kind, it is the duty of the medical officer to request an Epidemiological Unit survey as soon as possible. It is also advisable to ask for a routine epidemiological survey every 6 months.

### DEATHS DURING WEEK ENDED NOV. 23, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 23, 1946	Correspond- ing week, 1945
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	8,951	8,537
Average for 3 prior years.....	8,593	
Total deaths, first 47 weeks of year.....	423,505	420,237
Deaths under 1 year of age.....	708	506
Average for 3 prior years.....	554	
Deaths under 1 year of age, first 47 weeks of year.....	31,131	28,396
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67,316,985	67,293,022
Number of death claims.....	12,584	10,042
Death claims per 1,000 policies in force, annual rate.....	9.7	7.8
Death claims per 1,000 policies, first 47 weeks of year, annual rate.....	9.4	10.0

# INCIDENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 30, 1946

#### Summary

A total of 261 cases of poliomyelitis was reported, as compared with 366 last week, 176 for the corresponding week in 1944, and a 5-year median of 141. Slight increases occurred in the South Atlantic and East South Central areas. Of 21 States reporting 5 or more cases, 8 reported an increase (38 to 74), and 12 a decline (247 to 137). Kansas reported 12 cases each week. North Carolina, Florida, Mississippi, and Louisiana reported 24 cases, as compared with 8 last week. States reporting currently more than 12 cases each are as follows (last week's figures in parentheses): *Increases*—Massachusetts 17 (12), Minnesota 15 (7), Nebraska 13 (9); *decreases*—New York 14 (32), Illinois 29 (37), Michigan 14 (33), California 20 (22). For the year to date a total of 24,517 cases has been reported, as compared with 18,888 for the corresponding period in 1944 and a 5-year median of 12,134.

The percentage distribution of incidence for the year to date is as follows (corresponding percentages for 1944 in parentheses): New England 3.8 (4.2), Middle Atlantic 8.6 (43.7), East North Central 17.1 (16.9), West North Central 31.9 (6.1), South Atlantic 5.7 (15.2), East South Central 4.3 (5.8), West South Central 9.4 (2.6), Mountain 7.2 (1.1), Pacific 12.1 (4.4).

A total of 2,320 cases of influenza was reported during the current week, as compared with 2,404 last week, 13,220 for the corresponding week last year, and a 5-year median of 2,478. In the 16 weeks since August 15, 20,269 cases have been reported, as compared with 40,811 for the same period last year and a 5-year median for the period of 20,408.

Since the respective approximate dates of lowest seasonal incidence, totals reported have been below both the corresponding figures for last year and the 5-year medians for diphtheria, measles, meningococcus meningitis, scarlet fever, smallpox, typhoid and paratyphoid fever, typhus fever, and whooping cough.

Deaths recorded for the week in 93 large cities of the United States totaled 8,588, as compared with 8,951 last week, 9,462 and 9,406, respectively, for the same weeks of 1945 and 1944, and a 3-year (1943-45) average of 9,608. The cumulative total is 432,098, as compared with 429,699 for the corresponding period of 1945.



*Telegraphic morbidity reports from State health officers for the week ended Nov. 30, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45	Week ended—		Med- ian 1941- 45
	Nov. 30, 1946	Dec. 1, 1945		Nov. 30, 1946	Dec. 1, 1945		Nov. 30, 1946	Dec. 1, 1945		Nov. 30, 1946	Dec. 1, 1945	
NEW ENGLAND												
Maine.....	2	12	0	1	1	-----	155	1	14	0	0	1
New Hampshire.....	0	3	0	-----	-----	-----	2	21	12	0	0	0
Vermont.....	2	0	0	-----	-----	-----	141	2	-----	0	1	0
Massachusetts.....	15	3	4	-----	-----	-----	141	113	134	1	3	5
Rhode Island.....	1	0	0	1	-----	1	1	-----	1	0	1	1
Connecticut.....	0	5	0	3	-----	3	20	4	11	0	1	2
MIDDLE ATLANTIC												
New York.....	16	10	12	11	14	14	49	114	227	14	7	15
New Jersey.....	6	5	5	2	41	15	26	13	22	1	5	5
Pennsylvania.....	13	8	12	4	-----	2	207	528	289	3	15	11
EAST NORTH CENTRAL												
Ohio.....	22	37	21	4	51	9	130	19	22	1	4	3
Indiana.....	10	12	12	9	1,253	30	10	5	21	1	2	2
Illinois.....	1	8	8	1	10	10	11	208	31	4	14	14
Michigan <sup>1</sup> .....	8	21	12	-----	14	1	31	155	63	1	4	4
Wisconsin.....	0	4	0	16	32	17	26	20	125	4	4	2
WEST NORTH CENTRAL												
Minnesota.....	13	16	9	-----	3	2	7	5	7	2	4	1
Iowa.....	3	5	2	1	-----	5	5	1	21	0	3	1
Missouri.....	3	5	5	1	13	5	4	27	9	1	0	3
North Dakota.....	2	3	3	-----	647	20	5	-----	1	0	0	0
South Dakota.....	0	1	2	-----	14	-----	3	2	7	0	1	0
Nebraska.....	1	0	4	-----	112	5	10	4	4	3	0	0
Kansas.....	4	5	7	1	782	5	4	28	17	0	2	1
SOUTH ATLANTIC												
Delaware.....	3	2	0	-----	13	-----	-----	1	2	1	0	0
Maryland <sup>2</sup> .....	10	16	8	3	26	6	7	1	8	0	0	4
District of Columbia.....	0	1	0	-----	2	2	1	2	4	1	3	2
Virginia.....	17	27	23	221	1,438	187	67	44	44	1	0	2
West Virginia.....	2	5	7	-----	1,276	14	17	1	5	0	0	0
North Carolina.....	11	55	37	-----	-----	1	17	24	24	0	1	1
South Carolina.....	15	20	11	306	1,117	378	27	29	12	0	0	1
Georgia.....	12	11	11	40	81	40	10	9	9	1	0	1
Florida.....	10	10	8	11	-----	-----	2	6	6	1	1	2
EAST SOUTH CENTRAL												
Kentucky.....	17	13	10	1	14	3	-----	121	37	1	1	3
Tennessee.....	5	19	13	41	131	43	6	7	21	1	5	5
Alabama.....	6	12	16	31	346	97	3	5	5	0	2	2
Mississippi <sup>1</sup> .....	11	35	10	-----	-----	-----	-----	-----	-----	1	4	1
WEST SOUTH CENTRAL												
Arkansas.....	8	30	17	34	61	75	9	11	11	0	0	0
Louisiana.....	4	14	10	23	14	16	1	3	3	0	1	1
Oklahoma.....	4	10	15	53	54	60	-----	6	4	0	1	1
Texas.....	22	68	58	1,346	4,436	1,138	49	45	45	2	6	4
MOUNTAIN												
Montana.....	0	2	2	17	80	8	30	2	15	0	0	0
Idaho.....	2	1	1	6	24	2	3	91	10	1	0	0
Wyoming.....	3	0	0	-----	52	10	1	2	2	0	0	0
Colorado.....	2	9	9	11	447	50	6	8	10	0	2	1
New Mexico.....	8	6	3	4	4	2	21	1	1	0	0	1
Arizona.....	5	3	3	115	195	143	42	2	4	0	0	0
Utah <sup>1</sup> .....	0	0	0	2	383	3	9	29	29	0	0	0
Nevada.....	0	0	0	-----	-----	-----	1	-----	-----	0	0	0
PACIFIC												
Washington.....	2	6	6	-----	-----	-----	12	367	39	2	1	2
Oregon.....	1	2	2	3	15	15	11	20	58	0	1	1
California.....	13	41	33	7	34	34	65	345	345	6	5	5
<b>Total.....</b>	<b>315</b>	<b>561</b>	<b>461</b>	<b>2,320</b>	<b>13,220</b>	<b>2,478</b>	<b>1,405</b>	<b>2,452</b>	<b>3,538</b>	<b>55</b>	<b>105</b>	<b>105</b>
<b>All weeks.....</b>	<b>14,777</b>	<b>14,744</b>	<b>14,312</b>	<b>211,486</b>	<b>111,040</b>	<b>111,040</b>	<b>853,086</b>	<b>118,302</b>	<b>572,427</b>	<b>4,887</b>	<b>7,500</b>	<b>7,500</b>

<sup>1</sup> New York City only.

<sup>2</sup> Week ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Nov. 30, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever *		
	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45	Week ended—		Med-ian 1941-45
	Nov. 30, 1946	Dec. 1, 1945		Nov. 30, 1946	Dec. 1, 1945		Nov. 30, 1946	Dec. 1, 1945		Nov. 30, 1946	Dec. 1, 1945	
NEW ENGLAND												
Maine.....	2	2	0	48	37	23	0	0	0	1	1	1
New Hampshire.....	1	1	0	3	1	8	0	0	0	0	0	0
Vermont.....	1	2	1	2	6	2	0	0	0	0	0	0
Massachusetts.....	17	9	3	89	124	203	0	0	0	4	4	2
Rhode Island.....	0	0	0	5	10	7	0	0	0	0	1	1
Connecticut.....	0	2	2	15	24	39	0	0	0	0	2	0
MIDDLE ATLANTIC												
New York.....	14	21	17	178	251	251	0	0	0	1	4	6
New Jersey.....	4	1	3	24	64	81	0	0	0	1	0	1
Pennsylvania.....	3	4	4	131	170	188	0	0	0	0	2	4
EAST NORTH CENTRAL												
Ohio.....	10	2	4	238	251	251	1	0	0	2	0	3
Indiana.....	12	3	1	70	67	71	0	2	2	0	1	1
Illinois.....	29	10	6	121	149	176	0	1	1	3	0	1
Michigan *.....	14	3	3	116	140	140	0	0	0	0	2	3
Wisconsin.....	5	12	2	48	83	135	0	0	0	0	2	0
WEST NORTH CENTRAL												
Minnesota.....	15	3	1	21	46	72	0	0	0	0	0	0
Iowa.....	7	4	1	19	38	48	0	0	0	0	0	0
Missouri.....	8	11	3	12	53	54	0	0	0	2	0	1
North Dakota.....	5	0	0	2	5	10	0	0	0	0	0	0
South Dakota.....	1	1	1	2	8	15	0	0	0	0	0	0
Nebraska.....	13	1	1	33	47	28	0	0	0	0	0	0
Kansas.....	12	1	1	19	64	76	0	0	1	0	1	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	4	7	10	0	0	0	0	0	0
Maryland.....	4	1	1	10	51	51	0	0	0	0	0	1
District of Columbia.....	0	0	5	1	3	7	18	0	0	0	2	1
Virginia.....	*4	0	1	23	135	56	0	0	0	6	5	3
West Virginia.....	0	1	1	42	85	77	0	0	0	0	2	1
North Carolina.....	0	7	2	34	89	108	0	0	0	1	1	1
South Carolina.....	0	1	0	7	13	11	0	0	0	1	0	0
Georgia.....	2	1	1	10	22	29	0	0	0	0	2	2
Florida.....	6	4	0	13	7	7	0	0	0	1	3	2
EAST SOUTH CENTRAL												
Kentucky.....	1	0	1	38	62	62	0	0	0	0	0	1
Tennessee.....	2	5	1	29	39	58	0	0	0	0	3	3
Alabama.....	3	0	1	7	35	35	0	0	0	1	1	1
Mississippi *.....	6	1	1	9	22	16	0	0	0	0	0	3
WEST SOUTH CENTRAL												
Arkansas.....	5	1	1	11	10	14	0	0	0	1	1	3
Louisiana.....	5	4	1	2	14	14	0	0	0	1	3	3
Oklahoma.....	4	0	0	6	13	20	0	0	0	0	2	2
Texas.....	6	10	7	35	136	54	0	0	0	8	8	6
MOUNTAIN												
Montana.....	1	3	0	7	16	18	0	2	0	0	0	0
Idaho.....	0	0	0	8	6	10	0	1	0	2	0	0
Wyoming.....	0	0	0	1	5	5	0	0	0	0	1	0
Colorado.....	3	3	1	27	35	25	0	0	0	0	6	4
New Mexico.....	0	0	0	4	9	11	0	0	0	2	1	1
Arizona.....	0	0	1	8	4	6	0	0	0	0	1	1
Utah *.....	2	2	2	14	30	27	0	0	0	0	1	1
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	8	3	3	23	36	39	0	0	0	0	2	1
Oregon.....	0	2	1	38	24	17	1	0	0	6	1	1
California.....	20	31	18	121	283	227	0	0	0	1	4	4
Total.....	261	173	141	1,730	2,831	2,903	2	6	14	47	71	75
48 weeks.....	24,517	13,275	12,184	104,724	161,998	128,170	326	326	701	3,832	4,668	5,222

\* Period ended earlier than Saturday.

\* Including paratyphoid fever reported separately, as follows: Massachusetts 3 (salmonella infection); New Jersey 1; Ohio 1; Illinois 1; South Carolina 1; Florida 1; California 1.

\* Delayed report, 2 cases included.

Telegraphic morbidity reports from State health officers for the week ended Nov. 30, 1946, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Nov. 30, 1946							
	Week ended—		Median 1941- 45	Dysentery			En- ceph- alitis, infect- ious	Rocky Mt. spot- ted fever	Tula- ramia	Ty- phus fever en- demic	Un- dun- lant fever
	Nov. 30, 1946	Dec. 1, 1945		Ame- bic	Bacil- lary	Un- speci- fied					
NEW ENGLAND											
Maine.....	20	67	67	—	—	—	—	—	—	—	1
New Hampshire.....	—	15	5	—	—	—	—	—	—	—	—
Vermont.....	7	72	43	—	—	—	—	—	—	—	1
Massachusetts.....	163	165	165	—	1	—	—	—	—	—	—
Rhode Island.....	29	31	31	—	—	—	—	—	—	—	1
Connecticut.....	45	65	65	—	—	—	1	—	—	—	3
MIDDLE ATLANTIC											
New York.....	176	301	301	5	10	—	—	—	—	1	11
New Jersey.....	87	273	214	—	—	—	—	—	—	—	1
Pennsylvania.....	181	239	183	1	—	—	—	—	—	—	4
EAST NORTH CENTRAL											
Ohio.....	95	153	153	—	—	—	—	—	4	—	1
Indiana.....	12	18	18	1	—	—	3	—	7	—	3
Illinois.....	82	126	126	—	—	—	—	—	9	—	8
Michigan <sup>1</sup> .....	167	141	142	1	—	—	—	—	3	—	6
Wisconsin.....	216	48	117	—	—	—	—	—	—	—	1
WEST NORTH CENTRAL											
Minnesota.....	5	15	47	2	—	—	—	—	—	—	1
Iowa.....	18	10	10	—	—	—	—	—	—	—	14
Missouri.....	10	6	16	—	—	—	—	—	—	1	—
North Dakota.....	—	4	10	—	—	—	—	—	—	—	—
South Dakota.....	—	6	6	—	—	—	—	—	—	—	—
Nebraska.....	3	10	6	—	—	—	—	—	—	—	—
Kansas.....	5	22	29	—	—	—	—	—	—	—	7
SOUTH ATLANTIC											
Delaware.....	7	2	3	—	—	—	—	—	—	—	—
Maryland <sup>2</sup> .....	31	33	46	—	—	—	—	—	—	—	—
District of Columbia.....	1	4	4	—	—	—	—	—	—	—	—
Virginia.....	45	23	58	1	—	10	—	—	8	—	—
West Virginia.....	7	8	19	—	—	—	—	—	—	—	—
North Carolina.....	20	90	90	—	—	—	—	1	1	2	—
South Carolina.....	12	65	42	1	6	—	—	—	1	1	1
Georgia.....	20	24	16	1	—	—	—	—	1	11	4
Florida.....	38	5	9	—	—	—	—	—	—	2	12
EAST SOUTH CENTRAL											
Kentucky.....	30	39	39	—	2	—	—	—	—	—	—
Tennessee.....	14	30	42	—	—	—	—	1	1	4	1
Alabama.....	7	38	31	1	—	—	—	—	1	8	—
Mississippi <sup>2</sup> .....	—	—	—	—	—	—	—	—	—	2	4
WEST SOUTH CENTRAL											
Arkansas.....	12	8	20	—	—	—	—	—	—	—	3
Louisiana.....	1	1	3	—	—	—	—	—	—	2	1
Oklahoma.....	6	10	5	1	—	—	1	—	1	—	1
Texas.....	137	115	156	7	383	60	—	—	1	14	15
MOUNTAIN											
Montana.....	12	1	15	—	—	—	—	—	—	—	—
Idaho.....	3	65	8	—	3	—	—	—	—	—	—
Wyoming.....	5	—	4	1	—	—	—	—	—	—	—
Colorado.....	6	31	31	—	—	—	—	—	—	—	—
New Mexico.....	4	12	12	—	12	3	—	—	—	1	1
Arizona.....	17	9	11	—	—	17	—	—	—	—	—
Utah <sup>2</sup> .....	10	8	11	—	—	—	—	—	—	—	1
Nevada.....	—	—	—	—	—	—	—	—	—	—	—
PACIFIC											
Washington.....	10	30	30	—	—	—	—	—	—	1	—
Oregon.....	12	8	13	—	—	—	—	—	—	—	2
California.....	40	120	134	1	6	—	—	—	2	—	1
Total.....	1,818	2,566	2,566	24	423	90	5	2	35	50	109
Same week, 1945.....	2,566	—	—	28	457	127	10	0	30	97	88
Average, 1943-45.....	2,355	—	—	30	516	139	11	4	26	80	—
48 weeks: 1946.....	91,503	—	—	2,255	15,392	.021	588	566	896	3,215	4,933
1945.....	116,257	—	—	1,805	23,325	.078	597	464	694	4,858	4,601
Average, 1943-45.....	124,682	—	4165,897	1,832	20,853	8,590	617	4453	657	4,187	—

<sup>2</sup> Period ended earlier than Saturday.

<sup>4</sup> 5-year median, 1941-45.

WEEKLY REPORTS FROM CITIES<sup>1</sup>*City reports for week ended Nov. 23, 1946*

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough, cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	1	0	2	0	6	0	0	1
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	0	1	0	0	0	-----
Massachusetts:												
Boston.....	11	0	-----	0	8	1	5	7	13	0	0	38
Fall River.....	0	0	-----	0	2	1	0	0	3	0	0	5
Springfield.....	0	0	-----	0	4	0	0	2	0	0	0	23
Rhode Island:												
Providence.....	0	0	-----	0	5	0	2	0	7	0	0	45
Connecticut:												
Bridgeport.....	0	0	-----	0	-----	0	4	0	0	0	0	1
Hartford.....	0	0	-----	0	-----	0	1	0	4	0	0	4
New Haven.....	1	0	1	0	-----	2	0	0	1	0	1	13
MIDDLE ATLANTIC												
New York:												
Buffalo.....	0	0	-----	0	-----	0	5	0	4	0	0	10
New York.....	25	0	3	0	22	2	35	18	66	0	4	49
Rochester.....	0	0	-----	0	2	0	0	1	7	0	1	3
Syracuse.....	0	0	-----	0	1	0	1	0	14	0	0	36
New Jersey:												
Camden.....	1	0	1	1	-----	0	1	1	1	0	0	1
Newark.....	0	0	1	0	1	0	7	0	5	0	0	30
Trenton.....	0	0	1	0	17	0	2	0	2	0	0	1
Pennsylvania:												
Philadelphia.....	2	0	3	0	-----	1	15	2	26	0	0	33
Pittsburgh.....	5	0	-----	0	92	1	12	1	14	0	0	4
Reading.....	0	0	-----	0	2	0	0	0	2	0	0	8
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	2	0	-----	1	-----	0	2	0	7	0	1	2
Cleveland.....	0	0	7	1	31	0	8	6	20	0	0	14
Columbus.....	0	0	-----	0	2	0	0	0	4	0	0	4
Indiana:												
Fort Wayne.....	0	0	-----	0	3	0	2	1	1	0	0	-----
Indianapolis.....	2	0	-----	0	1	0	4	1	10	0	0	16
South Bend.....	0	0	-----	0	-----	0	0	0	3	0	0	-----
Terre Haute.....	0	0	-----	0	-----	0	1	0	2	0	0	-----
Illinois:												
Chicago.....	0	0	-----	0	3	1	15	12	48	0	0	41
Springfield.....	0	0	-----	0	-----	1	4	1	2	0	0	5
Michigan:												
Detroit.....	8	0	-----	0	2	2	7	4	34	0	0	57
Flint.....	0	0	-----	0	-----	0	2	2	18	0	0	-----
Grand Rapids.....	0	0	-----	0	-----	0	0	0	2	0	0	10
Wisconsin:												
Kenosha.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Milwaukee.....	0	0	-----	0	16	0	1	0	28	0	0	63
Racine.....	0	0	-----	0	-----	0	1	2	6	0	0	4
Superior.....	0	0	-----	0	1	0	0	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Minneapolis.....	2	0	-----	0	2	3	4	1	9	0	0	-----
St. Paul.....	2	0	-----	0	5	0	4	1	4	0	0	2
Missouri:												
Kansas City.....	0	0	-----	0	1	0	6	1	2	0	0	-----
St. Joseph.....	0	0	-----	0	-----	1	0	0	0	0	0	-----
St. Louis.....	3	0	2	0	1	1	7	4	12	0	2	2

<sup>1</sup> In some instances the figures include nonresident cases.

## City reports for week ended Nov. 23, 1946—Continued

Division, State, and City	Diphtheria cases	Erysipelas, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	—	0	—	0	0	0	0	0	0	—
Nebraska:												
Omaha	0	0	—	0	—	0	2	4	4	0	0	3
Kansas:												
Topeka	1	0	—	0	—	0	0	2	1	0	0	—
Wichita	0	0	1	0	1	0	2	1	3	0	0	—
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	—	0	—	0	1	0	2	0	0	5
Maryland:												
Baltimore	4	0	3	2	5	0	4	1	9	0	2	28
Cumberland	0	0	—	0	—	0	0	0	0	0	0	—
Frederick	0	0	—	0	6	0	0	0	0	0	0	—
District of Columbia:												
Washington	0	0	1	0	1	0	4	1	6	0	1	10
Virginia:												
Lynchburg	0	0	—	0	—	0	1	0	0	0	0	2
Richmond	0	0	—	0	10	0	0	0	1	0	1	—
Roanoke	1	0	0	0	—	0	1	0	1	0	0	—
West Virginia:												
Charleston	0	0	—	0	—	0	0	0	1	0	0	—
Wheeling	0	0	—	0	—	0	2	0	0	0	0	—
North Carolina:												
Raleigh	0	0	—	0	—	0	1	0	0	0	0	7
Wilmington	0	0	—	0	1	0	1	0	1	0	0	—
Winston-Salem	0	0	—	0	42	0	2	0	2	0	0	3
South Carolina:												
Charleston	0	0	2	0	1	0	2	0	0	0	0	—
Georgia:												
Atlanta	0	0	5	1	3	0	4	0	4	0	0	—
Brunswick	0	0	—	0	—	0	0	0	1	0	0	—
Savannah	0	0	—	0	5	0	0	0	0	0	0	—
Florida:												
Tampa	4	0	—	0	1	1	1	0	3	0	0	—
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	—	0	—	0	7	0	3	0	1	10
Nashville	0	0	—	1	—	0	4	0	1	0	0	—
Alabama:												
Birmingham	2	0	—	0	1	0	1	1	2	0	0	—
Mobile	0	0	1	1	—	0	2	0	1	0	0	—
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	—	0	1	0	0	1	1	0	0	—
Louisiana:												
New Orleans	0	0	5	1	—	0	2	3	2	0	0	1
Shreveport	0	0	—	0	—	0	0	0	0	0	0	—
Texas:												
Dallas	1	0	—	0	—	0	4	1	7	0	0	3
Galveston	0	0	—	0	—	0	3	0	0	0	0	—
Houston	1	0	—	0	—	0	2	0	1	0	0	1
San Antonio	2	0	—	2	—	0	6	1	3	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	—	0	2	0	1	0	0	0	0	—
Great Falls	0	0	—	0	1	0	1	0	2	0	0	—
Helena	0	0	—	0	—	0	0	0	0	0	0	—
Missoula	0	0	—	0	—	0	1	0	2	0	0	—
Colorado:												
Denver	2	0	5	0	1	2	9	1	22	0	0	3
Pueblo	0	0	—	0	—	0	0	0	1	0	0	—
Utah:												
Salt Lake City	0	0	—	0	2	0	0	0	5	0	0	—

## City reports for week ended Nov. 23, 1946—Continued

Division, State, and city	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle-----	3	0	-----	1	4	0	5	0	3	0	0	2
Spokane-----	0	0	-----	0	6	0	2	4	6	0	0	-----
Tacoma-----	1	0	-----	0	-----	0	0	0	1	0	0	-----
California:												
Los Angeles-----	6	0	11	0	10	4	5	4	28	0	2	6
Sacramento-----	0	0	-----	0	-----	0	2	0	0	0	0	-----
San Francisco-----	0	0	2	0	-----	2	6	0	11	0	0	6
Total-----	98	0	55	12	329	25	252	94	532	0	16	617
Corresponding week, 1945-----	97	-----	104	16	547	-----	289	-----	595	0	5	584
Average, 1941-45-----	91	-----	176	30	601	-----	367	-----	780	0	14	794

\* 3-year average, 1943-45.

\* 5-year median, 1941-45.

Dysentery, amebic.—Cases: New York 7; Philadelphia 1; Chicago 6; Detroit 1; Memphis 1; Los Angeles 1.

Dysentery, bacillary.—Cases: New York 14; Philadelphia 2; Chicago 1; San Antonio 1; Los Angeles 2.

Dysentery, unspecified.—Cases: Wilmington, Del., 1; San Antonio 12.

Typhemia.—Cases: Detroit 1; St. Louis 1.

Typhus fever, endemic.—Cases: Atlanta 1; Tampa 2; Memphis 1; New Orleans 3; Shreveport 1; Los Angeles 2.

## Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 34,083,900)

	Diphtheria case rates	Etiophallitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	34.7	0.0	2.9	0.0	58	11.6	40.4	28.9	98	0.0	2.9	375
Middle Atlantic.....	15.3	0.0	4.2	0.5	63	1.9	36.1	10.6	65	0.0	2.3	81
East North Central.....	7.3	0.0	4.3	1.2	36	1.3	29.2	17.6	115	0.0	0.6	132
West North Central.....	16.5	0.0	6.2	0.0	21	10.3	51.5	28.8	72	0.0	4.1	14
South Atlantic.....	14.7	0.0	18.0	4.9	123	1.6	39.2	3.3	51	0.0	6.5	90
East South Central.....	17.7	0.0	5.9	11.8	6	0.0	82.6	5.9	41	0.0	5.9	59
West South Central.....	11.5	0.0	14.3	8.6	3	0.0	48.8	17.2	40	0.0	0.0	17
Mountain.....	16.5	0.0	41.3	0.0	50	16.5	99.1	8.3	264	0.0	0.0	25
Pacific.....	15.8	0.0	20.6	1.6	32	9.5	31.6	12.7	77	0.0	3.2	22
Total.....	14.3	0.0	8.4	1.8	50	3.8	38.7	14.4	82	0.0	2.5	95

## TERRITORIES AND POSSESSIONS

## Panama Canal Zone

*Notifiable diseases—September 1946.*—During the month of September 1946, cases of certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence *									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox.....	2	—	1	—	2	—	2	—	7	—
Diphtheria.....	10	—	1	—	—	—	3	2	14	2
Dysentery:										
Amebic.....	2	—	1	—	2	—	2	1	7	1
Bacillary.....	3	—	—	1	4	—	—	—	7	1
Leprosy.....	—	—	—	—	—	—	1	—	1	—
Malaria.....	4	—	1	—	23	—	44	2	172	2
Measles.....	48	2	62	—	52	—	39	2	201	4
Mumps.....	—	—	—	—	—	—	10	—	10	—
Paratyphoid fever.....	1	—	—	—	1	—	—	—	2	—
Pneumonia.....	—	15	—	2	61	4	—	6	81	27
Tuberculosis.....	—	21	—	4	11	—	—	6	11	31
Typhoid fever.....	1	—	—	—	—	—	3	—	4	—
Typhus fever, endemic.....	—	—	—	—	1	—	—	—	1	—
Whooping cough.....	—	—	—	—	2	—	—	—	2	—

\* If place of infection is known, cases are so listed instead of by residence.

1 Includes 17 recurrent cases.

2 In the Canal Zone only.

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended November 9, 1946.*—During the week ended November 9, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Que- bec	Ont- ario	Mani- toba	Sas- katch- ewan	Al- berta	British Colum- bia	Total
Chickenpox.....		9	1	185	295	51	36	92	94	763
Diphtheria.....	2	2	2	42	8	3	8	1	1	89
Dysentery, bacillary.....				1						1
German measles.....				5	13		1	6	8	33
Influenza.....					3					4
Measles.....		118	3	66	85	23	197	101	19	612
Meningitis, meningococ- cus.....				3	1				1	5
Mumps.....				18	259	14	74	33	114	510
Pollomyelitis.....	1	2	1	28	14		2			50
Scarlet fever.....		12	6	90	90	17			18	245
Tuberculosis (all forms).....		10	13	78	48	21	16	115	36	337
Typhoid and paraty- phoid fever.....			1	4					7	12
Undulant fever.....				4	2					6
Veneral diseases:										
Gonorrhea.....		14	16	140	120	45	28	32	79	474
Syphilis.....	1	20	8	101	84	9	13	10	28	274
Whooping cough.....		10		26	66	2	4	10		113

### PANAMA

*Encephalomyelitis.*—Under date of November 21, 1946, the Director of Public Health of Panama reported an outbreak of equine encephalomyelitis in the interior of the country. Five human cases have also been confirmed, 2 of them proving fatal.

### REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

#### Cholera

*China.*—Cholera has been reported in certain provinces of China as follows: Island of Formosa (Taiwan), September 1–10, 1946, 171 cases, 80 deaths, September 11–20, 1946, 123 cases, 65 deaths, September 21–30, 1946, 130 cases, 69 deaths; Kwangtung Province, October 1–10, 1946, 83 cases, 24 deaths.

#### Plague

*Argentina—Buenos Aires.*—Under date of December 3, 1946, information was received of the occurrence of 9 cases of bubonic plague with 3 deaths in Buenos Aires, Argentina. The cases were stated to have occurred in an isolated and distant area of the port zone on the suburban waterfront.



**Smallpox**

*China—Hong Kong.*—For the week ended November 23, 1946, 196 cases of smallpox were reported in Hong Kong, China, with the number of deaths also declining from the preceding week.

*Colombia.*—For the month of October 1946, 88 cases of smallpox with 3 deaths were reported in Colombia. Departments reporting the highest incidence are: Santander, 37 cases, 2 deaths; Caldas, 18 cases; Tolima, 12 cases.

**Typhus Fever**

*Belgian Congo.*—During the week ended November 9, 1946, 43 cases of typhus fever were reported in Belgian Congo.

*Colombia.*—During the month of October 1946, 72 cases of typhus fever with 3 deaths were reported in Colombia. Departments reporting the highest incidence are: Narino, 28 cases, 2 deaths; Antioquia, 20 cases, 1 death; Caldas, 19 cases.

**Yellow Fever**

*French Equatorial Africa—Ubangi Shari Department—Carnot.*—Yellow fever has been reported in the town of Carnot, on the upper Shanga River, in Ubangi Shari Department, French Equatorial Africa, as follows: On November 23, 1946, 1 death, and on November 25, 1946, 2 fatal cases (suspected).

**FEDERAL SECURITY AGENCY**  
**UNITED STATES PUBLIC HEALTH SERVICE**

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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# Public Health Reports

VOLUME 61

DECEMBER 27, 1946

NUMBER 52

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The Story of the National Leprosarium

Changes in State and Territorial Health Authorities



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# Public Health Reports

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## ANNOUNCEMENT

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### COMPETITIVE EXAMINATIONS FOR THE REGULAR CORPS OF THE UNITED STATES PUBLIC HEALTH SERVICE

Competitive examinations will be held early in 1947 for appointment to the Regular Corps of the United States Public Health Service. Seventy-five vacancies exist in grades of assistant and senior assistant scientist.

Written examinations, covering each candidate's particular field of science, as well as related fields, will be held April 14 and 15 at places mutually convenient to the applicant and the Service. Oral examinations will be held during the period February 13–April 9 in 30 cities strategically located throughout the United States.

Commissions are available to scientists trained in any of the following fields: bacteriology, mycology, parasitology, entomology, malacology, biology, chemistry, physiology, physics, statistics (mathematical, demographic, etc.), psychologists, and milk and food specialists. Assignments will be in line with the individual's demonstrated ability and experience.

An applicant for the grade of assistant scientist must be a citizen of the United States, have 7 years of educational and professional training or experience, possess a certificate or diploma from an institution of recognized standing, and be able to pass a physical examination given by a medical officer of the United States Public Health Service. The same requirements, plus an additional 4 years of training or experience, apply to those seeking the grade of senior assistant scientist.

Commissioned officers in the Regular Corps enjoy the same benefits and privileges as do officers of the Army, Navy, or Marine Corps. The grade of assistant scientist is equal to that of first lieutenant in the Army. Annual pay, with allowances for dependents, is \$3,811. A senior assistant scientist ranks with a captain of the Army and draws, with allowances for dependents, \$4,351 a year.

United States Public Health Service officers are entitled to full medical care and hospitalization for themselves and their families, including disability retirement at three-fourth's base pay. They receive 30 days annual leave with pay. Periodic promotions are based upon length of service and merit. The retirement age is 64.

Application forms and additional information may be obtained by writing the Surgeon General, United States Public Health Service, Washington 25, D. C.

## Places and dates of oral examination:

Atlanta, Ga.—USPHS Communicable Disease Center, 605 Volunteer Building.	Feb. 13.
Austin, Tex., University of Texas.....	Feb. 15.
Baltimore, Md.—Marine Hospital, Wyman Park Dr. and 31st St.	Apr. 8.
Boston, Mass.—Marine Hospital, 77 Warren St. (Brighton)----	Apr. 1.
Chicago, Ill.—Marine Hospital, 4141 Clarendon Ave.....	Mar. 18 and 19
Cleveland, Ohio—Marine Hospital, Fairhill Rd. and East 124th St.	Apr. 3.
Columbia, S. C.—USPHS Malaria Research Laboratory, State Hospital.	Mar. 11.
Columbus, Ohio—Ohio State University (Pharmacology and Bacteriology Bldg.).	Apr. 4.
Denver, Colo.—USPHS District No. 8, Room 615, Colorado Bldg.	Feb. 25.
Detroit, Mich.—Marine Hospital, Windmill Pointe.....	Mar. 21.
Eugene, Oreg.—University of Oregon.....	Feb. 21.
Iowa City, Iowa—State University of Iowa (Physics Bldg., Room 205).	Mar. 17.
Kansas City, Mo.—USPHS District No. 7, Room 603, B. M. A. Bldg.	Mar. 15.
LaFayette, Ind.—Purdue University (Stanley Coulter Hall, Room 6).	Mar. 20.
Los Angeles, Calif.—USPHS Relief Station, Room 406, Federal Bldg.	Feb. 18.
Louisville, Ky.—Marine Hospital, Portland Ave. and 22d St.---	Mar. 13.
Minneapolis, Minn.—University of Minnesota Medical School..	Feb. 27.
Nashville, Tenn.—Vanderbilt University Medical School.....	Mar. 12.
New Orleans, La.—Marine Hospital, 210 State St.....	Feb. 14.
New York, N. Y.—USPHS District No. 1, SubTreasury Bldg., 15 Pine St.	Mar. 31.
Omaha, Nebr.—Creighton University.....	Feb. 26.
Pittsburgh, Pa.—University of Pittsburgh.....	Apr. 5.
Raleigh, N. C.—North Carolina State Health Department.....	Mar. 10.
Rochester, N. Y.—University of Rochester.....	Apr. 2.
St. Louis, Mo.—Marine Hospital, 525 Couch Ave., Kirkwood..	Mar. 14.
Salt Lake City, Utah—University of Utah.....	Feb. 24.
San Francisco, Calif.—Marine Hospital, 14th Ave. and Park Blvd.	Feb. 19 and 20.
Seattle, Wash.—Marine Hospital, Judkins St. and 14th Ave. South.	Feb. 22.
Tucson, Ariz.—University of Arizona.....	Feb. 17.
Washington, D. C.—USPHS Dispensary, 4th and D Sts. SW....	Apr. 9.

## THE STORY OF THE NATIONAL LEPROSARIUM

THE UNITED STATES MARINE HOSPITAL, CARVILLE, LOUISIANA

By G. H. FAGET, *Medical Director (Medical Officer in Charge), United States Public Health Service*

### INTRODUCTION

Leprosy is one of the oldest diseases of the human race, its origin lost in antiquity. Yet for centuries it has been one of the most misunderstood and dreaded diseases of mankind. Any person who became afflicted with leprosy was condemned to a hopeless life of isolation. Even to the present day an unjustified fear of leprosy lingers among the general public.

But there is no cause for this leprophobia. The fact is that leprosy is an infectious, mildly contagious disease, which is transmitted from the sick to the well in some uncertain manner. It is not so contagious as tuberculosis, yet people have less fear of contact with a tuberculous person. The danger of exposure to leprosy is slight and not sufficient to warrant the widespread terror of earlier times.

It is noteworthy that leprosy is most feared in countries where the disease is scarce and the danger of contagion relatively insignificant, whereas in certain tropical countries, where leprosy is most prevalent and the risk of contagion greatest, it is generally regarded with indifference by the natives. This illustrates the adage that familiarity breeds contempt, for in such countries, those afflicted with leprosy are seldom prevented from mingling with the public.

Although there is little danger of contracting leprosy in most civilized nations, where it is a rare disease, it must be admitted that the only sure means of eradicating leprosy from any land is segregation. In the absence of a specific curative remedy and of the knowledge of the exact mode of transmission, the isolation of infectious cases is the only means of controlling the disease. Voluntary segregation should be encouraged, because compulsory segregation, since it conflicts with human freedom, often fails. The modern leprosarium should have special attractions for the prospective patient, and no expense should be spared for his comfort and welfare. Primarily, it should be a hospital and a home, not an asylum. Every effort should be made to permit the leading of a normal life.

The public should know that recent improvement in the treatment of leprosy renders it no longer a hopeless disease. Moreover, early voluntary admission greatly enhances the patient's chance of discharge from the institution in restored health. An ever-increasing number of patients is being discharged from leprosariums as "arrested cases" and no longer a menace to the public.



Although leprosy is one of the oldest known diseases, it was not until 1873 that its causative agent, the "leprosy bacillus," was discovered by the Norwegian scientist, G. Armauer Hansen. Prior to that time, the disease had been confused with other conditions; now it can be identified more easily.

#### LEPROSY IN THE UNITED STATES

The origin and spread of leprosy in the United States is most interesting. Following its introduction from foreign lands, it generally did not spread, finding unfavorable soil in the native-born population of most localities. The State of New York is a good example of this relative immunity of the population. Five or six cases of leprosy are encountered there annually. The board of health institutes a thorough investigation of each reported case. It has been found that, with possibly one or two exceptions, leprosy has never originated in New York State. Leprosy in New York and most other Eastern States is an imported disease. In the majority of cases the infection has been traced to the West Indies, South America, the European nations bordering the Mediterranean, and other infected countries.

In the central and northern States, only occasional cases of leprosy have been found, usually among immigrants. Minnesota, Iowa, and Wisconsin have been an exception to this rule. There leprosy was introduced by Norwegian and Swedish settlers in the middle of the 19th century. Altogether, between 160 and 200 Scandinavians afflicted with leprosy settled in these States, the largest number of them in Minnesota. Although no new cases of leprosy developed in the Scandinavian settlement during the first 50 years, seven new cases occurred between 1895 and 1916, most of them in families of the imported cases. None have occurred since then, showing that, although the disease spread temporarily in Minnesota and the neighboring States, it did not thrive there and soon was extinguished.

Leprosy is constantly being introduced into California and the other Pacific Coast States by Chinese immigrants, as well as by Filipinos and Hawaiians. Most of these immigrants are in the latent stage of the disease upon entering the country, and leprosy may not manifest itself until years later. In the southern part of California, the disease is introduced by Mexicans. So far, comparatively few native-born Californians have contracted leprosy in California. These number 21 or 22 cases among the 233 patients admitted to the Carville leprosarium from that State.

Geographically, we recognize the Gulf Coast States as the most active focus of leprosy in the United States. Here, especially in certain parts of Florida, Texas, and Louisiana, leprosy has become a public health problem.

The origin of leprosy in Florida can be traced to the early Spanish settlers and their imported African slaves. Romans's history of Florida, written in 1776, describes the existence of leprosy among the Negroes of that State. Since then, the disease has no doubt also been imported from Cuba and other islands of the West Indies. In certain parts of Florida, leprosy has become endemic and is being slowly transmitted from one generation to the next.

In Texas, leprosy has established a foothold, mostly along the Rio Grande. The early cases in this State came from Mexico, but today the disease is communicable on Texas soil. The records of the United States Marine Hospital at Carville, La., indicate that 226 cases of leprosy were admitted from Texas and that there were 171 natives of that State admitted, most of whom were infected in Texas.

Today there is a greater incidence of leprosy in proportion to population in Louisiana than in any other State of the Union. Two possible sources of leprosy in Louisiana were considered by that eminent student of leprosy, Isadore Dyer. These were: importation from the West Indies, and origination among the Acadians, who came from Canada between 1756 and 1760. The former is the more probable source of the two.

#### THE LOUISIANA LEPER HOME

Although leprosy continued to spread in southern Louisiana, particularly among the Acadian descendants, it was not until 1894 that any constructive action was taken against the disease. In that year the State legislature passed an act creating a board of control, whose function was to provide a home for sufferers of leprosy. By the end of the year, a temporary site had been leased for 5 years in Iberville Parish. This was the old Indian Camp Plantation, about 80 miles up the Mississippi River from New Orleans.

On November 30, 1894, eight patients were transported from New Orleans by night on a coal barge towed by a tug. The next morning they arrived at their new home. About a year after the opening of the home, the board of control, realizing that the patients were not receiving sufficient attention, requested the Sisters of Charity to care for them. A contract was drawn up between the Community of Sisters and the State of Louisiana, whereby the Sisters assumed the gratuitous domestic charge and nursing care of the patients. Four Sisters volunteered their services and came to stay with the patients. The Sisters took up residence in the old colonial home of the abandoned plantation, and the patients were housed in the old slave cabins. This was a temporary arrangement while a site more convenient for administrative purposes was being sought nearer New Orleans.

In 1900, the State legislature appropriated a sum of money sufficient for the purchase of such a site and the building of a leprosarium. Unfortunately, misguided neighbors were so strongly opposed to this plan that, when the transfer of the patients was proposed, they burned the buildings.

Thereafter, attempts to find a new location for the leprosarium were abandoned and, instead, new cottages housing 10 patients each were constructed on the plantation to replace the old slave shacks. Gradually, suitable housing to accommodate comfortably a hundred patients and a new building for use as a dining room and kitchen were provided. This was the condition of the efficiently functioning Louisiana Leper Home in 1920, when the Federal Government negotiated to take it over.

Many years previously the Federal health authorities had already become aware of the necessity for more stringent measures to check the progress of leprosy in the United States. A committee of experts testified before Congress that leprosy existed in practically every State of the Union, that the disease had been present for a number of years, that it was on the increase, and that the only known means of effectively controlling it was segregation. By 1916 the information gathered through scientific investigation in previous years had been compiled; it indicated the advisability of Congressional provision for a home where all persons afflicted with leprosy might be cared for and treated.

However, not until February 3, 1917, did Congress enact legislation and provide funds for the establishment of a national leprosarium to be under the administration of the United States Public Health Service.

Because of World War I, action on this legislative measure was postponed for several years. Then a committee of Public Health Service officers was appointed to select a suitable site for the proposed leprosarium. Great difficulty was experienced in this task. No State cared to cede territory to the Government for use as a sanatorium for leprosy. Finally, the matter was settled by purchasing from the State of Louisiana on January 3, 1921, the property occupied by the Louisiana Leper Home.

#### THE NATIONAL LEPROSARIUM

The State of Louisiana then transferred the patients, hospital, and grounds to the United States Public Health Service. At a flag-raising ceremony, the national leprosarium was officially opened on February 1, 1921, with O. E. Denney as its first medical officer in charge. There were at that time 90 patients in the home. It immediately became necessary to enlarge and rehabilitate the existing

buildings, because of the expected rapid increase in population. Soon new patients were admitted from many States, and the census of the institution quickly rose to 172.

On March 4, 1923, the sum of \$645,000 was appropriated by an act of Congress in order to expand further the capacity of the leprosarium. This building program was completed in 1924, when housing facilities for approximately 425 patients became available.

The act of Congress of February 3, 1917, authorizing the construction of the national leprosarium, had directed the Surgeon General of the Public Health Service to prepare rules and regulations for the type of patients to be admitted. These regulations stipulated that there should be admitted to the leprosarium:

(1) Any person afflicted with leprosy who presents himself or herself for care, detention, and treatment, or

(2) Who may be apprehended under authority of the United States quarantine acts, or

(3) Any person afflicted with leprosy duly consigned to said home by the proper health authorities of any State, Territory, or the District of Columbia.

Leprosy was the first disease for which the United States Government made specific regulations pertaining to the transportation of infected persons. Since 1912 the Interstate Quarantine Regulations have provided rules for the safe transport of persons who present symptoms of leprosy.

After the necessary State permits are received, patients are transferred to the leprosarium accompanied by a medical officer of the Public Health Service. A compartment is provided for the patient, who is strictly isolated during the trip. All dishes and utensils are disinfected before leaving the compartment, all secretions or discharges are disinfected and properly disposed of, and the space occupied is disinfected upon being evacuated by the patient. As now practiced by the Public Health Service, the transportation of persons with leprosy is effected without exposing the public to any danger of infection.

In this country, there is evidence that the greatest menace of leprosy is to the health of the other members of an afflicted person's household. The risk of contagion is considerable, especially to children, in the intimacy of the family circle. It has been estimated authoritatively that a patient can expect that approximately 10 percent of the members of his family who continue to live with him will develop the disease. This should be an inducement for him to seek early hospitalization. He should realize that one of the greatest boons of his segregation in a leprosarium is the protection it insures his loved ones at home. The high incidence of leprosy in certain families is well demonstrated

in the records of the Carville Marine Hospital and has frequently been commented upon by certain writers and experts on the subject. The concealment of a person with leprosy by his family often strikes home again, as it may lead to the infection of other members of the family. Concealment and transmission of leprosy within the family group seems an important factor in keeping the disease alive in this country. On the other hand, the rather feeble contagiousness of leprosy among nonrelatives is striking. At the Carville leprosarium, during the 51 years of its operation, only one case of leprosy developed among the employees, in spite of their continued proximity to the patients. This is a good record and shows the feebleness of communicability of the disease when ordinary precautions are taken.

#### RECENT IMPROVEMENTS IN THE NATIONAL LEPROSARIUM

Until recently, most of the buildings of the Federal leprosarium at Carville were of wooden frame structure and therefore a fire hazard. Starting in the spring of 1940, at a cost of approximately \$2,500,000, the Government undertook to rebuild the institution almost completely, in order to make it fireproof. This building program was completed by the end of 1941. Facilities have been increased to take care of 480 ambulatory patients, in addition to the 65 hospital rooms for bed patients. At present, the leprosarium at Carville can be considered the finest and most modern in the world.

The visitor who approaches the Federal leprosarium at Carville for the first time is surprised to see such imposing buildings in an otherwise rural district. After he enters the reservation of 350 acres, he is impressed by the fact that it is a self-sustaining community, resembling a small town. There is a power plant for the generation of electricity, the manufacture of ice, and the operation of a central steam-radiator heating system. A modern sand-filtration plant with attached chlorinating apparatus furnishes over 200,000 gallons of potable water a day. Both hot and cold water is piped to all the buildings of the colony. The water consumption per capita is above that of most large cities in the United States. This meets with the approval of the administrative force, since cleanliness is conducive to health and the source of supply, the Mississippi River, is inexhaustible. There are two modern sanitary laundries, one for the patients, the other for the personnel. A large sanitary dairy with pasteurization and cold-storage facilities produces 180 gallons of grade A milk a day. Cattle are raised to furnish beef products. Protestant and Catholic churches and their respective resident chaplains afford the patients religious comfort. A well-equipped fire department is ready to function at all hours. The sewage system with its septic tanks and the incinerator plant for the disposal of garbage assure the complete sanitation of the community and pro-



FIGURE 1.—Airplane view of the National Leprosarium, Carville, La.



FIGURE 2.—A patient's bedroom.



FIGURE 3.—New nurses' home.



FIGURE 4.—Patients' bandstand.

tection of the neighboring public. An extensive drainage system demands constant attention to prevent a mosquito nuisance and a possible malaria menace. Besides the numerous buildings for the use of the patients and the large nurses' home, there are 25 residences for doctors, administrative and clerical personnel, mechanics, and other employees. All the personnel are employees of the Federal Government; there are no volunteer workers. Paved roads connect the different parts of the reservation.

Passing from the personnel to the colony side of the estate, the visitor comes first to the hospital, where the bed patients are treated. This is a two-story concrete building containing 44 rooms for men and 21 rooms for women patients. In addition, it contains a first-class operating room, an adequate X-ray department, a dental clinic, a bacteriologic and pathologic laboratory, a physiotherapy department, dressing-room clinics for men and women, offices, and examining rooms.

The ambulatory patients, who are by far in the majority, are domiciled in 16 two-story concrete buildings. Each of these buildings contains, on each floor, 15 individual bedrooms, bathrooms, a reception room, and front and back porches. The front porches are connected upstairs and downstairs by concrete passageways, screened and covered for the protection of the patients in going about the colony.

Every effort has been made to provide the patients with the comforts of home. For the most part, they are contented and well satisfied with all that is being done for them. They can pursue their avocations and enjoy a variety of community activities. Each patient has his own room with adequate modern fireproof furniture. He may arrange and decorate his room to suit his taste. Visitors are allowed daily from 7 a. m. to 7 p. m. Under certain conditions patients are permitted to visit their homes for periods of 10 days to 2 weeks, twice a year. There are no restrictions in correspondence with relatives or friends except that all outgoing mail is disinfected.

On each side of the hospital is a building for occupational therapy. Each of these two-story buildings has 18 rooms. These rooms are used, respectively, as sewing room, music room, school room, photography room, barber shop, tailor shop, pressing shop, carpenter shop, shoemaker's shop, bicycle-repair shop, radio-repair shop, rooms for various other arts and crafts, and finally the printing offices of the patients' local paper, "The Star." This is an interesting monthly periodical, the purpose of which is "radiating the light of truth on Hansen's disease." It contains many splendid articles from the pens of patients. Its outside circulation is increasing and has now reached 2,500.

Occupational therapy in its different forms is a useful part of the patients' treatment. Occupation has a good moral effect upon the



patient; it prevents his brooding upon his malady. The employment of 112 patients on a small salary basis by the Government serves the same purpose. It also affords them ready cash for the purchase of the little luxuries not furnished by the Government. The Government provides all patients with food, clothing, toilet articles, books, magazines, newspapers, a golf course, tennis courts, baseball, basketball, and other sporting equipment, and three motion-picture shows each week.

The new recreation building has filled a long-felt need at the National Leprosarium. This beautiful, spacious, two-story structure is the feature of the new construction program which has pleased the patients most. It cost approximately \$140,000 and was well worth the price for the recreational facilities it affords this group of shut-in citizens from practically every State of the Union. A modern motion-picture theater, a canteen operated by patients for the benefit of the patients, smoking rooms for men and women, a pool room, and a splendid library with many excellent books are on the first floor. On the top floor is a huge ball- or concert-room with an orchestral platform on one side. Here frequent dances are given by the patient body. Baton Rouge and New Orleans bands come to play the latest swing music. Between dances the floor space is used for indoor games such as ping-pong, darts, shuffleboard, bingo, cards, and dominoes.

The patients are served their meals cafeteria style at 7 a. m., noon, and 5 p. m. The dining room adjoins a clean, well-equipped kitchen. Menus are carefully planned; the food is well cooked, tasty, and nutritious. The meals served can be compared to those of a first-class hotel. Food plays a direct part in the fight against the disease, and no effort is spared to provide the best.

#### ACTIVITIES OF THE NATIONAL LEPROSARIUM

The medical, surgical, and nursing services are qualified to cope with the disease. The nursing is in the hands of 21 Sisters of Charity, some of whom were retained by the Federal Government from the Louisiana State regime. The Sisters are graduate nurses and have always given satisfactory service. The patients appreciate their gentle manner and tender nursing care.

The medical staff consists of six medical officers, one dentist, and three consultants from New Orleans. The consultants are specialists in dermatology, orthopedics, and neuropsychiatry and make monthly visits to the institution.

In addition to keeping up with all new developments in general medicine, the medical staff specializes in leprosy. The medical library is well stocked with books and medical journals dealing with the subject.

Besides general institutional care, the patients are given any special treatment which may be thought beneficial to their condition. With few exceptions, all of the patients take some form of treatment. During the last fiscal year, a smaller number of patients than usual were taking chaulmoogra-oil treatment either by mouth or by intramuscular injections. Since chaulmoogra oil and its derivatives have not proved to be specifics for leprosy, their popularity is declining. The impression, however, persists that chaulmoogra-oil products are of some benefit in certain types of the disease and so continue to be used in those cases.

Several new experimental treatments have recently been undertaken on a number of patients. Diphtheria toxoid, for which enthusiastic claims were made elsewhere, was subjected to an extensive study in a carefully-controlled experiment on a large group of patients. The results were disappointing.

Vaccine and serum therapies have been tried and have proved unsatisfactory. Penicillin also has proved unsuccessful.

Vitamin therapy has been given an extensive trial. Multiple vitamins have been found useful for their general tonic effect. Massive doses of vitamin A and of vitamin D did not produce any direct effect on leprosy lesions. Vitamin B<sub>1</sub> (thiamin chloride) in large doses was found efficacious in relieving painful leprosy neuritis. Riboflavin (vitamin B<sub>2</sub>) was used in certain leprotic eye manifestations, but without definite benefit. Pyridoxine (vitamin B<sub>6</sub>) has been helpful in symptomatic relief of some debilitated patients.

The most outstanding scientific advance made at the National Leprosarium has been the discovery of the beneficial effects of the sulfone drugs in the treatment of leprosy. These new drugs, promin, diasone, and promizole, are at present the treatment of choice and are rapidly replacing chaulmoogra oil in this hospital.

Promin, after more than 4 years' experience, is now considered to be a chemotherapeutic agent of established value. Diasone, after more than 2 years' use, is beginning to prove as effective as promin. Promizole, used on a smaller scale for only 1 year and still considered to be in the experimental stage, is already showing favorable therapeutic action.

The good results of the sulfone drugs are reflected in the increased number of patients discharged during the last fiscal year in comparison with the numbers for previous fiscal years. Thirty-four patients were discharged with arrested disease last year, approximately twice the usual annual number. The increase in the number of patients discharged last year can be attributed largely to sulfone therapy. Thirteen of these discharged patients reached the clinically and bacteriologically negative stage after 2 to 4 years of promin treatment and one patient after 1½ years of diasone treatment.

Although the above results are extremely encouraging, the search for a more rapidly acting specific remedy continues. Streptomycin, now under thorough clinical investigation at the National Leprosarium, may or may not prove to be the long-sought solution to this baffling ancient problem.

Besides special medication during institutional treatment, attempts are made to discover and remove any intercurrent disease which might react unfavorably upon leprosy. The eye, ear, nose, and throat complications of leprosy are frequent and require energetic treatment. A full-time specialist devotes all of his time to this work. He is able to give relief to the patients and prevent some disabling conditions from developing.

The physiotherapy department is a busy service. Approximately 15,000 treatments are given yearly in electrotherapy, thermotherapy, hydrotherapy, and massage. These various forms of physiotherapy are found useful in relieving nerve pains, restoring muscular functions, and healing ulcerations.

In the dental clinic, a dentist and his assistant keep the patients' mouths and teeth in hygienic condition. This helps them in regaining their health.

The laboratory is equipped for scientific research in the various phases of leprosy. In connection with it there is a well-kept animal house for guinea pigs, rabbits, mice, rats, opossums, and Syrian hamsters, which are used for experimental purposes. Attempts at the reproduction of leprosy in these various laboratory animals are being continued. A full-time bacteriologist conducts these research experiments.

The dermatologic, orthopedic, and neuropsychiatric clinics are well attended. They supplement the other medical activities of the hospital and afford the patient expert professional advice in these specialties.

The Carville Marine Hospital, being the only leprosarium in the United States, serves as a center for the dissemination of knowledge on the subject of leprosy. Numerous letters of inquiry are received and answered annually.

The institution is also used as a postgraduate instructional center on leprosy. During the past year, 295 doctors, 6 dentists, and 217 nurses visited the station, seeking clinical information on the disease. Some of the visiting physicians came from distant States and several from foreign countries. The postgraduate class in tropical medicine of Tulane University attended a clinical demonstration on leprosy at Carville. Members of the medical staff of the Carville leprosarium went to New Orleans to lecture to these doctors on different aspects of the disease. Every year leprosy clinics are attended by the senior medical students of Louisiana State University and of Tulane Univer-

sity and by the senior dental students of Loyola University, all of New Orleans. It is felt that this practical experience will aid these doctors in the earlier diagnosis of leprosy in their future medical careers.

#### STATISTICAL DATA

During the period of State control, 338 patients were admitted, all but 16 of them from Louisiana. Ninety of these patients were in the State hospital on February 1, 1921, when the Federal Government took charge, and were transferred to the National Leprosarium. From February 1, 1921, to January 1, 1946, 1,179 patients were admitted, making a total of 1,517 admissions since December 1, 1894. Of this number, 685 have died at the hospital, 54 have been deported to foreign countries, and 354 have been discharged as arrested and no longer a menace to public health. Seventy-one of these have relapsed and returned to the hospital for further treatment.

Of the total admissions, 448 were foreign-born, the largest number (172) coming from Mexico. All patients, of course, were in the United States when their disease was discovered. Among the States from which patients were admitted, Louisiana leads with 613, California follows with 227, Texas is third with 226, New York fourth with 131, and Florida fifth with 80. All other States have sent a total of 240. Patients have been received from 41 States, the District of Columbia, the Philippine Islands, Hawaii, and the Canal Zone.

Table 1 shows the nativity of patients admitted during the past 10 years.

TABLE 1.—*Nativity of patients (calendar year)*

Nativity	Year									
	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945
United States.....	17	23	26	26	41	29	25	19	23	20
Insular possessions.....	2	3	1	3	6	1	5	2	3	4
Other countries.....	7	14	11	14	15	12	11	13	16	5
Total.....	26	40	38	43	62	42	41	34	42	29

In Table 2 is given the number of men and women in the hospital at the end of each year during the past 10 years.

TABLE 2.—*Number of patients in hospital (calendar year)*

Cases	Year									
	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945
Male.....	274	258	239	248	246	249	258	261	260	251
Female.....	113	113	113	116	131	123	122	123	120	118
Total.....	380	371	352	364	377	372	380	384	380	369

Table 3 gives the number of patients discharged as "arrested" and no longer a menace to public health during the last 10 fiscal years, each year ending on June 30 of the year given in the table.

TABLE 3.—*Patients discharged from leprosarium (fiscal year)*

Discharged as "arrested"	Year									
	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Male.....	16	11	12	11	8	5	6	13	11	22
Female.....	5	7	5	2	6	5	5	7	2	12
Total.....	21	18	17	13	14	10	11	20	13	34

### CONCLUSIONS

At present the Carville leprosarium is fully equipped for properly dealing with leprosy. There is an increasing local interest in the welfare of the patients. Achievements in treatment are growing more important each year, and discharges of "arrested" cases show a corresponding increase. It is felt that there is need for a more general education of the public in order that the unwarranted popular fear of leprosy may be replaced by a more enlightened attitude. There is need for replacement of the odious words "leprosy" and "leper," which are usually unjustly associated in the public mind with "unclean." The patients at Carville prefer to call their malady Hansen's disease. This name meets with the approval of the professional staff. In addition, a better education of persons afflicted with leprosy and their families is also necessary in order that more patients may seek voluntary admission during the early stages of the disease.

Everything possible should be done to encourage voluntary admission. Prospective patients should realize that early institutional care and treatment will give them a better chance of arresting the disease. Voluntary admission is the goal for which we strive. With the renewed hope offered by the new sulfone drugs, this goal is not beyond our reach.

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## CHANGES IN STATE AND TERRITORIAL HEALTH AUTHORITIES

### Change No. 4 to Directory of State and Territorial Health Authorities (Supplement No. 180 to Public Health Reports—1945 Revision)

The following changes and additions have been received since compilation of Change No. 3.<sup>1</sup> Notice of further changes should be addressed to the Records and Reports Unit, Bureau of States Services, United States Public Health Service, Washington 25, D. C.

#### ALASKA TERRITORIAL DEPT. OF HEALTH

Maternity, infant, and child (preschool) health services, and Crippled children's services:

(Delete: N. Berneta Block, M. D., M. P. H., director)

Division of Maternal and Child Health and Crippled Children's Services.

#### CALIFORNIA STATE DEPT. OF HEALTH

Malaria and mosquito control:

(Delete: C. G. Gillespie)

(Insert: Arve H. Dahl, chief)

Mosquito Control Section.

(Add:)

Miscellaneous activities:

Hospital inspection:

J. B. Askew, M. D., chief  
Bureau of Hospital Inspection.

Hospital surveys:

P. K. Gilman, M. D., chief  
Bureau of Hospital Surveys.

#### COLORADO STATE BOARD OF HEALTH

Crippled children's services:

(Delete: Robert A. Downs, D. D. S., C. P. H., acting director)

(Insert: J. Burris Perrin, M. D., C. P. H., director)

Division of Maternal and Child Health.

Maternity, infant, and child (preschool) health services:

(Delete: Robert A. Downs, etc.)

(Insert: J. Burris Perrin, M. D., C. P. H., director)

Division of Maternal and Child Health.

Dental services:

(Delete: "Acting" from title of Robert A. Downs)

Industrial hygiene:

(Delete: Robert J. Owens, director)

Division of Industrial Hygiene.

Venereal disease control:

(Delete: Ward L. Chadwick, M. D., director)

Division of Venereal Disease Control.

Miscellaneous activities:

Add:

Hospital inspection:

J. B. Perrin, M. D., C. P. H., director.

Division of Maternal and Child Health.

<sup>1</sup> Change No. 1 appeared in PUBLIC HEALTH REPORTS, **61**: 1386-1387 (Sept. 20, 1946); Change No. 2, **61**: 1544-1547 (Oct. 25, 1946); Change No. 3, **61**: 1701-1703 (Nov. 22, 1946).

**CONNECTICUT STATE DEPT. OF HEALTH****Vital records:**(Delete: **William C. Welling**, director)

Bureau of Vital Statistics.

**Narcotic control:**(Delete: **Arthur J. Rivard**)(Insert: **Angelo A. Zurlo**, narcotic agent)

Division of Narcotic Control.

**Nutrition:****Add:****Helen J. Phaneuf**, chief nutrition consultant.

Division of Local Health Administration.

**DELAWARE STATE BOARD OF HEALTH****Communicable disease control, general:**(Delete: **J. R. Beck**, M. D., director)

Division of Communicable Disease Control.

**Tuberculosis control:****Field services:**(Delete: **J. R. Beck**, M. D., director)

Division of Communicable Disease Control.

**DISTRICT OF COLUMBIA HEALTH DEPT.****Add:****Cancer services:****D. L. Seckinger**, M. D., assistant health officer, director  
Cancer Control.**Nutrition:****Ella Oppenheimer**, M. D., director  
Bureau of Maternal and Child Welfare.**IOWA STATE DEPT. OF HEALTH****Industrial hygiene:**(Delete: **N. J. Corrozzo**, M. D., acting medical director)

Industrial Hygiene.

**KENTUCKY STATE DEPT. OF HEALTH****Administration, general:****Personnel administration:**(Delete: **Carl M. Gambill**, M. D., M. P. H.)(Insert: **Sara C. Stice**, personnel officer).**Communicable disease control, general:**(Delete: **Fred W. Caudill**, M. D., M. P. H., director)

Division of Epidemiology.

**Tuberculosis control:****Field services:**(Insert: **Edward N. Maxwell**, M. D., M. P. H., acting director)

Division of Tuberculosis.

**MARYLAND STATE DEPT. OF HEALTH****Administration, general:**

Accounting and financing, and

Personnel administration:

(Delete: **W. N. Kirkman**, chief)(Insert: **James P. Slicker**, acting chief)

Division of Personnel and Accounts

**Add:****Cancer services:****C. H. Halliday**, M. D., chief

Bureau of Communicable Diseases.

Maternity, infant, and child (preschool) health services:

(Delete: **Dean Roberts**, M. D., chief)(Insert: **Edward Davens**, M. D., chief)

Bureau of Child Hygiene.

**Add:****Mental hygiene:****Edward Davens**, M. D., chief

Bureau of Child Hygiene.

**MICHIGAN DEPARTMENT OF HEALTH****Local health administration:**(Delete: **E. V. Thiehoff**, M. D., M. P. H.)(Insert: **J. K. Aldland**, M. D., director)

Bureau of Local Health Services.

**Vital records:**(Delete: **Gertrude Prenta**, acting director)(Insert: **Stuart T. Friant**, director)

Bureau of Records and Statistics.

**OHIO DEPARTMENT OF HEALTH****Administration, general:****Personnel administration:**(Delete: **A. M. Settles**)(Insert: **James E. Bauman**, chief)

Division of Administration.

**Nutrition:**(Delete: **Martha Koehne**, Ph. D.)(Insert: **Susan P. Souther**, M. D., M. P. H., chief)

Division of Child Hygiene.

**SOUTH CAROLINA STATE BOARD OF HEALTH****Public health education:**(Delete: **Andrew Peeples**, assistant director)(Insert: **James A. Hayne**, M. D., director)

Division of Public Health Education.

**Sanitation activities:****Milk sanitation:**(Delete: **H. B. Hiers**, principal sanitarian)(Insert: **William Weston**, senior sanitary engineer)

Division of Sanitary Engineering.

Maternity, infant, and child (preschool) health services:  
 (Delete: **Robert W. Ball, M. D., M. P. H.**, director)  
 (Insert: **Hilla Sheriff, M. D., M. P. H.**, director)  
 Division of Maternal and Child Health.

#### VIRGINIA DEPARTMENT OF HEALTH

Crippled children's services:  
 (Insert: **G. W. Comstock, M. D.**, acting director)  
 Bureau of Crippled Children.  
 Tuberculosis control:  
 Field services:  
 (Insert: **G. W. Comstock, M. D.**, acting director)  
 Bureau of Tuberculosis Out-patient Service.  
 Venereal disease control:  
 (Insert: **E. M. Holmes, M. D.**, director)  
 Division of Venereal Disease Control.

#### WEST VIRGINIA STATE DEPT. OF HEALTH

(Delete: **Bruce H. Pollock**, Deputy State Health Commissioner)  
 Administration, general:  
 (Delete: **Bruce H. Pollock**, deputy State health commissioner)  
 (Delete: **F. L. Hungerford**, chief of business management and personnel officer)  
 (Insert: **Paul B. Shanks**, administrative assistant)  
 Fiscal Office.  
 Communicable disease control, general:  
 (Delete: **Charles C. Hedges, M. D.**, director)  
 Division of Communicable Diseases.  
 Industrial hygiene:  
 (Insert: **H. G. Bourne**, acting director)  
 Bureau of Industrial Hygiene.

Maternity health services:  
 (Delete: **Glenn A. Carmichael, M. D.**, director)  
 Division of Maternal and Child Hygiene.  
 Public health education:  
 (Delete: **Ruth Frantz**, director)  
 Bureau of Public Health Education.  
 Venereal disease control:  
 (Delete: **J. C. Hume**, acting director)  
 Bureau of Venereal Disease Control.

#### WISCONSIN STATE BOARD OF HEALTH

Cancer services:  
 (Delete: **Allan Filek, M. D., M. P. H.**, director)  
 Local Health Services.  
 (Insert: **H. M. Guilford, M. D.**, chief)  
 Bureau of Preventable Disease.  
 Public health education:  
 (Delete: **Ruth McConnell**, assistant health educator)  
 (Insert: **John Cullnan**, editor)  
 Health Education.  
 Public health nursing:  
 (Insert: **Janet Jennings, R. N.**, supervisor)  
 Bureau of Public Health Nursing.  
 School health services:  
 (Delete: **Amy L. Hunter, M. D., M. P. H.**, chief)  
 (Insert: **Catherine Campbell**, school health educator)  
 Bureau of Maternal and Child Health.  
 Venereal disease control:  
 (Delete: **Milton Trautman, M. D., M. P. H.**)  
 (Insert: **H. M. Guilford, M. D.**, acting chief)  
 Division of Venereal Disease.  
 Funeral directing and embalming, supervision of:  
 (Delete: **Allan Filek, M. D., M. P. H.**)  
 (Insert: **Paul Weis**, supervisor)  
 Division of Funeral Directors and Embalming.  
 Add:  
 Statistical services:  
**Vivian Holland**, statistician  
 Statistical Services.



## PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

November 3-30, 1946

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended November 30, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941-45.

### DISEASES ABOVE MEDIAN PREVALENCE

*Poliomyelitis*.—The number of cases of poliomyelitis dropped from 3,298 during the preceding 4 weeks to 1,581 during the 4 weeks ended November 30. The number was, however, 1.7 times the figure for the corresponding period in 1945 and more than 2 times the 1941-45 median. The Pacific section reported fewer cases than in 1945, but in all other sections the cases exceeded the 1945 incidence, and in all sections the numbers of cases were considerably above the 1941-45 median expectancy. While the peak of the current epidemic has been passed in all sections of the country and the rate of decline is about normal, there is still a relatively high number of cases of this disease being reported. The number of cases (1,581) was the highest reported for this period in the 18 years for which records have been kept in this form. States reporting more than 50 cases for the current 4-week period were: Illinois 162, New York 121, California 104, Missouri 79, Minnesota 78, Wisconsin 77, Texas 69, Iowa 67, Kansas 65, and Massachusetts and Indiana 52 each.

### DISEASES BELOW MEDIAN PREVALENCE

*Diphtheria*.—For the 4 weeks ended November 30 there were 1,514 cases of diphtheria reported, as compared with 2,624 for the corresponding period in 1945 and a 5-year (1941-45) median of 1,904 cases. For the fourth consecutive 4-week period the current number of cases for a 4-week period has been less than the number reported for any corresponding period in the 18 years for which these data are available in this form. Prior to the latter part of 1944 there had been a consistent decline in the incidence of this disease, but from that time until July 1946, inclusive, the number of cases for each 4-week period was higher than for the corresponding period in the preceding year, as well as higher than the preceding 5-year median for each period. The

largest decreases have occurred in the southern part of the country where the incidence of the disease has been highest. However, in the North Atlantic sections during the current 4 weeks the incidence was higher than in 1945, and also considerably above the seasonal expectancy in those sections.

*Influenza.*—The number of cases (8,662) of influenza reported for the current 4 weeks was less than 35 percent of the number reported during the corresponding 4 weeks in 1945, and 90 percent of the 1941–45 median. The incidence was below the normal seasonal expectancy in all sections except the West South Central; approximately 4,700 of the total cases in that section (5,139) were reported from Texas, where large numbers are nearly always reported. The 1945–46 epidemic was in progress at this time in 1945, and the 1941–45 median is represented by the 1941 figure, which was slightly above the normal incidence during the month of November; the 1939–44 median number of cases for the month of November was approximately 7,500 cases.

*Measles.*—The incidence of measles was also relatively low, 5,990 cases being reported for the 4 weeks ended November 30, as compared with 8,146 during the corresponding period in 1945 and a preceding 5-year median of 9,986 cases. The number of cases in the New England section was about 50 percent above the median and in the West South Central region the incidence was slightly above normal, but in all other sections the numbers of cases fell below the median expectancy.

*Meningococcus meningitis.*—For the 4 weeks ended November 30 there were 250 cases of meningococcus meningitis reported as compared with 397 for the corresponding period in 1945. The 1941–45 median was represented by the 1945 figure. The number of cases reported from each geographic section was below the seasonal expectancy. For the country as a whole the current incidence was the lowest for this period since 1941 when there were 145 cases reported.

*Scarlet fever.*—The incidence of scarlet fever (7,051 cases) during the current 4 weeks was 65 percent of the 1941–45 median (10,716 cases). The number of reported cases was relatively low in each geographic section of the country. In the West North Central, South Atlantic and West South Central sections the incidence was less than 50 percent of the 1941–45 median. For the entire country the current incidence was the lowest recorded for this period in the 18 years for which records have been kept in this form.

*Smallpox.*—The number of cases of smallpox continued at a relatively low level, the 16 cases reported for the 4 weeks ended November 30 being slightly below the 1945 incidence for the corresponding period, and about 35 percent of the 1941–45 median. In the East South Central section 3 cases were reported as against a preceding 5-year median of 1 case, but in other sections the number of cases was the same as the median or fell below it.

*Typhoid and paratyphoid fever.*—During the 4 weeks ended November 30 the number of cases of these diseases reported was less than 75 percent of the 1941–45 median expectancy. The incidence was slightly above normal in the New England and Pacific sections, but in all other sections the numbers of cases were relatively low. For these diseases the current incidence was the lowest in the 18 years for which these data are available.

*Whooping cough.*—Fewer cases of whooping cough were reported during the current 4-week period than occurred during the corresponding period in 1945, and the number of cases (7,703) was less than 80 percent of the 1941–45 median. The West South Central section reported a slight increase over the median, but a very significant decline in the number of cases was reported from each of the other eight geographic sections.

*Number of reported cases of 9 communicable diseases in the United States during the 4-week period November 3–30, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941–45*

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	1,514	2,624	1,904	8,662	25,381	9,627	5,990	8,146	9,986
New England.....	83	67	30	12	10	36	1,883	644	1,286
Middle Atlantic.....	164	77	119	42	78	78	1,402	1,992	1,992
East North Central.....	195	378	242	128	2,102	305	708	1,446	1,064
West North Central.....	125	207	159	22	1,701	95	121	222	570
South Atlantic.....	338	714	591	2,452	7,647	2,681	751	434	434
East South Central.....	223	412	276	224	1,114	599	106	340	310
West South Central.....	208	514	450	5,139	10,408	4,037	287	245	245
Mountain.....	67	83	79	574	2,219	659	330	633	738
Pacific.....	106	172	172	69	109	140	402	2,140	1,438
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States.....	250	397	397	1,581	932	755	7,051	10,714	10,714
New England.....	19	19	49	91	72	50	581	701	977
Middle Atlantic.....	64	98	98	167	158	155	1,339	1,765	1,814
East North Central.....	53	96	96	442	220	127	2,306	2,562	2,864
West North Central.....	25	35	35	372	116	60	528	981	1,105
South Atlantic.....	24	25	53	102	56	56	630	1,657	1,447
East South Central.....	20	40	40	53	39	39	403	734	734
West South Central.....	20	32	32	153	55	55	231	681	526
Mountain.....	8	8	11	51	30	20	285	409	409
Pacific.....	37	44	44	150	186	86	748	1,224	1,224
	Smallpox			Typhoid and paratyphoid fever			Whooping cough <sup>2</sup>		
United States.....	16	24	45	229	304	312	7,703	9,377	9,973
New England.....	0	0	0	21	23	15	1,020	1,317	1,287
Middle Atlantic.....	0	0	0	23	38	50	2,094	2,974	2,974
East North Central.....	5	8	11	26	31	32	2,282	2,027	2,466
West North Central.....	3	0	7	13	17	17	225	255	523
South Atlantic.....	1	2	2	29	49	49	814	949	1,186
East South Central.....	3	5	1	22	24	32	182	458	458
West South Central.....	8	4	4	52	74	74	627	494	526
Mountain.....	0	5	2	15	26	29	181	316	316
Pacific.....	1	0	1	28	22	17	278	587	737

<sup>1</sup> Mississippi and New York excluded; New York City included.

<sup>2</sup> Mississippi excluded.

## MORTALITY, ALL CAUSES

Deaths recorded for the 4 weeks ended November 30 in 93 large cities totaled 34,898, as compared with a preceding 3-year (1943-45) average of 35,940 deaths. During the third week of the 4-week period the number of cases was 4 percent above the average, but in each of the other 3 weeks the number of deaths was lower than the preceding 3-year average; during the last week (ended November 30) the number of deaths was more than 10 percent less than the 3-year average.

The birth rate (28.6 per 1,000 population) for the month of October was the highest since the establishment of the birth registration area in 1915. On the other hand, the general and infant mortality rates for October were the lowest in recent years.

## DEATHS DURING WEEK ENDED NOVEMBER 30, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 30, 1946	Correspond- ing week, 1945
Data for 92 large cities of the United States:		
Total deaths.....	8,562	9,421
Average for 3 prior years.....	9,576	
Total deaths, first 48 weeks of year.....	430,644	428,288
Deaths under 1 year of age.....	725	673
Average for 3 prior years.....	662	
Deaths under 1 year of age, first 48 weeks of year.....	31,685	28,877
Data from industrial insurance companies:		
Policies in force.....	67,331,056	67,287,995
Number of death claims.....	10,600	13,337
Death claims per 1,000 policies in force, annual rate.....	8.2	10.3
Death claims per 1,000 policies, first 48 weeks of year, annual rate.....	9.4	10.0

# INCIDENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED DECEMBER 7, 1946

#### Summary

A total of 242 cases of poliomyelitis was reported for the week, as compared with 262 last week and a 5-year (1941-45) median of 99. An increase occurred in the Middle Atlantic area (from 21 to 36 cases), and in the Pacific area (28 to 30 cases). Of 19 States reporting 5 or more cases each, 9 (all Middle Atlantic and North Central States except Virginia and Texas) reported an increase from 58 to 89 cases, while 8 (all in the North Central area except Massachusetts and Washington) showed a decline from 116 to 85. States reporting currently 10 or more cases each are as follows (last week's figures in parentheses): *Increases*—New York 25 (14), Michigan 17 (14); *decreases*—Illinois 26 (29); Minnesota 10 (15), Nebraska 10 (13). California reported 20 cases for each week. During the past 38 weeks, the period since the approximate average date of lowest seasonal incidence in past years, a total of 24,292 has been reported, as compared with 13,046 and 18,758 for the corresponding periods, respectively, of 1945 and 1944, and a 5-year median of 11,928.

Only a slight increase was reported for the current week in the incidence of influenza. A total of 2,813 cases was reported, as compared with 2,320 last week, 2,449 and 49,694, respectively, for the corresponding weeks in 1944 and 1945, and a 5-year median of 2,742. Since July 27, the approximate average date of lowest seasonal incidence, a total of 24,102 cases has been reported, as compared with 91,836 for the corresponding period last year and a 5-year median of 24,489.

Currently 401 cases of diphtheria were reported (last week 315), of which 34 occurred in Kentucky, 29 in New York, 28 in California, 25 in Virginia, 24 in Maryland, 23 in Ohio, and 20 in Mississippi, all representing increases over last week's figures. The total for the corresponding week last year was 528, and the 5-year median is 415.

A total of 9,716 deaths was recorded for the week in 93 large cities of the United States, as compared with 8,588 last week, 9,945 for the corresponding week last year, and a 3-year (1943-45) average of 9,910. The cumulative total is 441,814, as compared with 439,644 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Dec. 7, 1946, and comparison with corresponding week of 1945 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Dec. 7, 1946	Dec. 8, 1945		Dec. 7, 1946	Dec. 8, 1945		Dec. 7, 1946	Dec. 8, 1945		Dec. 7, 1946	Dec. 8, 1945	
NEW ENGLAND												
Maine.....	2	4	1	9	-----	-----	311	8	8	0	0	0
New Hampshire.....	0	2	0	1	-----	-----	4	25	8	1	0	0
Vermont.....	0	0	0	-----	-----	-----	163	4	4	1	0	0
Massachusetts.....	14	2	2	-----	-----	-----	181	213	213	4	3	6
Rhode Island.....	0	0	0	2	-----	1	14	-----	2	1	1	1
Connecticut.....	1	2	1	-----	3	2	55	6	16	3	2	3
MIDDLE ATLANTIC												
New York.....	29	19	16	14	15	18	268	227	295	6	13	13
New Jersey.....	8	3	3	6	19	10	72	30	25	3	3	5
Pennsylvania.....	11	12	11	6	21	5	470	447	447	4	9	10
EAST NORTH CENTRAL												
Ohio.....	23	41	17	11	94	14	128	15	36	3	4	4
Indiana.....	18	11	13	6	1,317	47	5	7	17	3	3	3
Illinois.....	4	7	7	1	38	14	16	244	69	4	16	12
Michigan <sup>1</sup> .....	10	8	8	2	2	2	10	190	39	2	1	1
Wisconsin.....	1	6	1	30	61	34	47	30	30	1	3	3
WEST NORTH CENTRAL												
Minnesota.....	9	6	6	-----	4	2	5	1	5	2	1	1
Iowa.....	3	10	4	-----	176	2	10	2	32	0	3	1
Missouri.....	11	10	6	2	42	14	-----	66	12	0	2	2
North Dakota.....	2	2	2	-----	277	10	1	4	4	0	1	0
South Dakota.....	0	0	1	-----	-----	-----	1	1	1	0	0	0
Nebraska.....	1	1	2	5	577	-----	9	10	9	1	1	0
Kansas.....	6	8	5	18	6,848	18	8	24	21	0	1	0
SOUTH ATLANTIC												
Delaware.....	0	0	0	-----	11	-----	1	1	2	0	0	-----
Maryland <sup>1</sup> .....	24	12	10	2	27	8	12	7	7	1	1	4
District of Columbia.....	0	1	0	-----	3	3	-----	1	3	3	1	1
Virginia.....	25	43	21	422	3,993	371	61	61	61	6	2	4
West Virginia.....	5	6	6	42	3,395	20	42	-----	8	1	1	2
North Carolina.....	6	46	28	-----	-----	2	97	34	34	0	2	1
South Carolina.....	11	9	9	423	2,459	517	26	49	29	0	1	1
Georgia.....	15	23	17	16	253	116	39	4	4	1	6	2
Florida.....	12	4	4	8	6	6	15	3	3	4	3	2
EAST SOUTH CENTRAL												
Kentucky.....	34	13	13	-----	15,358	6	-----	122	22	0	3	2
Tennessee.....	7	15	11	25	299	40	4	4	20	0	3	3
Alabama.....	9	13	13	41	362	80	3	3	3	0	3	3
Mississippi <sup>1</sup> .....	20	20	12	-----	-----	-----	-----	-----	-----	1	2	1
WEST SOUTH CENTRAL												
Arkansas.....	15	21	15	39	785	117	13	19	22	2	5	1
Louisiana.....	4	20	9	1	50	13	1	10	3	0	1	1
Oklahoma.....	4	9	9	15	180	180	1	14	10	2	0	1
Texas.....	14	73	56	1,343	7,332	1,352	43	52	52	3	3	3
MOUNTAIN												
Montana.....	0	3	2	-----	129	21	25	6	52	0	1	1
Idaho.....	0	1	1	14	181	2	8	136	8	0	0	0
Wyoming.....	1	0	0	-----	72	11	4	9	9	0	0	0
Colorado.....	3	3	3	33	607	49	9	41	41	2	0	1
New Mexico.....	3	5	3	-----	3	-----	32	1	1	0	0	0
Arizona.....	1	2	1	261	323	127	38	5	5	2	0	0
Utah <sup>1</sup> .....	2	1	0	1	4,241	10	8	34	29	1	0	1
Nevada.....	0	0	0	-----	46	-----	-----	-----	1	0	0	0
PACIFIC												
Washington.....	5	4	5	-----	-----	1	17	259	43	2	1	1
Oregon.....	0	6	5	9	45	16	22	25	40	0	0	2
California.....	28	21	22	15	50	55	123	333	249	7	12	12
Total.....	401	528	415	2,813	49,694	2,742	2,397	2,787	3,998	77	118	118
49 weeks.....	16,178	17,272	14,643	214,299	160,734	160,734	655,433	121,089	580,588	15,465	7,618	7,618
Seasonal low week <sup>2</sup> ..	(27th) Jul. 5-11			(30th) Jul. 26-Aug. 1			(35th) Aug. 30-Sep. 5			(37th) Sep. 13-19		
Total since low.....	6,550			10,375			8,156			24,102		
	10,375			8,156			24,102			1,123		
	8,156			24,102			1,123			1,123		
	24,102			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
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	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123			1,123		
	1,123			1,123			1,123					

Telegraphic morbidity reports from State health officers for the week ended Dec. 7, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Dec. 7, 1946	Dec. 8, 1945		Dec. 7, 1946	Dec. 8, 1945		Dec. 7, 1946	Dec. 8, 1945		Dec. 7, 1946	Dec. 8, 1945	
NEW ENGLAND												
Maine.....	1	4	1	51	30	25	0	0	0	0	0	1
New Hampshire.....	1	0	0	0	6	6	0	0	0	0	0	0
Vermont.....	1	1	0	9	6	7	0	0	0	0	0	0
Massachusetts.....	5	5	4	140	122	244	0	0	0	5	2	2
Rhode Island.....	0	0	0	11	9	9	0	0	0	0	1	0
Connecticut.....	2	0	0	16	18	37	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York.....	25	12	14	226	273	278	0	0	0	2	4	6
New Jersey.....	6	7	4	94	61	76	0	0	0	1	0	2
Pennsylvania.....	5	0	2	139	165	213	0	0	0	1	6	6
EAST NORTH CENTRAL												
Ohio.....	9	4	4	302	255	278	0	0	0	0	2	5
Indiana.....	9	2	0	88	65	65	0	1	4	4	0	1
Illinois.....	26	7	4	105	165	196	0	0	0	1	1	1
Michigan <sup>1</sup> .....	17	3	3	132	154	154	0	0	0	0	3	1
Wisconsin.....	8	15	1	69	113	140	0	0	0	1	1	1
WEST NORTH CENTRAL												
Minnesota.....	10	2	0	37	37	88	0	0	0	0	0	0
Iowa.....	4	0	0	37	46	52	0	0	0	0	0	0
Missouri.....	9	13	1	32	48	49	0	0	0	0	0	1
North Dakota.....	5	0	0	8	6	14	0	0	0	0	0	0
South Dakota.....	5	0	0	11	4	33	0	0	0	0	0	0
Nebraska.....	10	1	0	32	47	31	0	0	0	0	0	0
Kansas.....	9	3	3	30	66	88	1	1	1	0	1	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	8	6	7	0	0	0	0	1	0
Maryland <sup>1</sup> .....	4	1	1	25	58	61	0	0	0	0	0	2
District of Columbia.....	2	2	0	2	20	20	0	0	0	0	0	0
Virginia.....	6	3	2	60	90	69	0	0	0	2	0	2
West Virginia.....	2	0	1	23	67	51	0	0	0	0	1	1
North Carolina.....	2	4	1	27	58	96	0	0	0	2	1	1
South Carolina.....	0	2	1	5	17	17	0	0	0	0	1	3
Georgia.....	2	3	1	17	28	34	0	0	0	2	3	4
Florida.....	1	3	0	5	13	13	0	0	0	2	1	1
EAST SOUTH CENTRAL												
Kentucky.....	0	1	2	29	58	58	0	0	0	1	1	1
Tennessee.....	1	2	1	27	53	58	0	1	0	0	3	3
Alabama.....	1	2	1	11	27	27	0	0	0	0	0	0
Mississippi <sup>1</sup> .....	4	3	0	17	19	19	0	0	0	1	0	1
WEST SOUTH CENTRAL												
Arkansas.....	2	2	2	10	22	6	0	0	0	2	2	2
Louisiana.....	2	5	1	0	39	14	0	0	0	1	3	3
Oklahoma.....	3	0	1	6	22	26	0	0	0	0	0	2
Texas.....	8	5	5	28	121	67	0	0	0	3	11	10
MOUNTAIN												
Montana.....	0	1	0	4	14	22	0	0	0	2	0	0
Idaho.....	1	0	0	26	27	27	0	4	0	0	0	0
Wyoming.....	0	1	0	2	1	3	0	0	0	0	0	0
Colorado.....	2	2	2	18	35	36	0	0	0	3	0	0
New Mexico.....	0	1	1	11	35	12	0	0	0	0	0	2
Arizona.....	1	1	0	16	27	9	0	0	0	0	0	0
Utah <sup>1</sup> .....	1	4	1	13	35	35	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	2	0	0	0	0	0	0
PACIFIC												
Washington.....	7	20	7	35	38	38	0	0	0	4	0	0
Oregon.....	3	0	2	38	40	37	0	0	0	1	1	1
California.....	20	21	14	139	245	179	0	0	0	1	2	4
Total.....	242	168	99	2,161	2,901	3,091	1	7	12	44	52	79
49 weeks.....	24,758	13,443	12,230	106,855	164,899	131,727	327	333	716	3,876	4,720	5,306
Seasonal low week.....	(11th) Mar. 15-21			(32nd) Aug. 9-15			(35th) Aug. 30-Sept. 5			(11th) Mar. 15-21		
Total since low.....	24,292	13,046	11,928	20,590	31,081	31,081	48	60	97	3,401	4,096	4,721

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Dates between which the approximate seasonal low week end4. The specific date will vary from year to year.

<sup>3</sup> Including paratyphoid fever reported separately, as follows: Massachusetts 5 (salmonella infection); New York 1; Georgia 2; Florida 2; California 1.

<sup>4</sup> Correction: Poliomyelitis, Nebraska, week ended November 23, 8 cases (instead of 9).

Telegraphic morbidity reports from State health officers for the week ended Dec. 7, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Dec. 7, 1946							
	Week ended—		Median 1941-45	Dysentery			Enceph- alitis, infectious	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever, en- demic	Un- du- lant fever
	Dec. 7, 1946	Dec. 8, 1945		Ame- bic	Bacil- lary	Un- spec- ified					
NEW ENGLAND											
Maine.....	13	41	36								
New Hampshire.....	17	26	8								
Vermont.....	16	23	30								
Massachusetts.....	182	150	150		2				2		1
Rhode Island.....	15	31	31								1
Connecticut.....	58	73	73								
MIDDLE ATLANTIC											
New York.....	261	320	345	9	11		1				4
New Jersey.....	192	164	164	7							1
Pennsylvania.....	163	180	165								5
EAST NORTH CENTRAL											
Ohio.....	119	201	152			1			2		3
Indiana.....	20	28	17						14		2
Illinois.....	100	127	127	4	1		1	1	13		9
Michigan <sup>1</sup> .....	160	186	204	1	1				1		1
Wisconsin.....	225	99	135								5
WEST NORTH CENTRAL											
Minnesota.....	6	15	42	5							1
Iowa.....	49	6	22	1							16
Missouri.....	18	4	8						15		
North Dakota.....			10								
South Dakota.....		2	2								
Nebraska.....	18	16	2								
Kansas.....	4	11	27	1					4		13
SOUTH ATLANTIC											
Delaware.....	4	1	1								
Maryland <sup>1</sup> .....	64	27	37	1					2		2
District of Columbia.....	4	5	8								
Virginia.....	84	54	54			33			3		3
West Virginia.....	26	26	26								
North Carolina.....	53	59	85						2	2	
South Carolina.....	30	74	44	3	1					2	
Georgia.....	15	27	9	1	5					9	3
Florida.....	37	5	10	1	1					7	2
EAST SOUTH CENTRAL											
Kentucky.....	1	51	51						1		
Tennessee.....	11	14	42	7					3	1	
Alabama.....	13	2	5							5	4
Mississippi <sup>1</sup> .....										4	5
WEST SOUTH CENTRAL											
Arkansas.....	5	4	20	2					1		
Louisiana.....	1	1	2		1				2	3	1
Oklahoma.....	7	12	11								1
Texas.....	157	124	138	11	324	27			1	13	14
MOUNTAIN											
Montana.....	11	6	24								
Idaho.....		12	4								
Wyoming.....	6	1	2								
Colorado.....	6	32	31				1				3
New Mexico.....	5	2	2								
Arizona.....	6	6	11			25					
Utah <sup>1</sup> .....	2	10	26								
Nevada.....											
PACIFIC											
Washington.....	10	48	48								
Oregon.....	11	18	18								
California.....	47	108	126	1	3		1			2	5
Total.....	2,252	2,432	2,675	55	350	86	4	1	66	48	105
Same week, 1945.....	2,432			30	310	98	8	1	35	112	68
Average, 1943-45.....	2,358			52	508	121	10	7 0	30	7 112	
45 weeks: 1946.....	93,755			2,310	15,742	6,107	592	567	962	3,263	5,038
1945.....	118,689			1,835	23,635	10,178	605	465	729	4,970	4,669
Average, 1943-45.....	127,040		7169,469	1,884	21,362	8,711	627	7 453	687	4,804	

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> 5-Year median, 1941-45.

Anthrax: Massachusetts 1 case.



WEEKLY REPORTS FROM CITIES<sup>1</sup>*City reports for week ended Nov. 30, 1946*

This table lists the reports from 82 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and city	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	4	0	2	1	5	0	0	-----
New Hampshire:												
Concord.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Vermont:												
Barre.....	1	0	-----	0	-----	0	0	0	0	0	0	-----
Massachusetts:												
Boston.....	7	0	-----	0	4	2	10	5	19	0	0	34
Fall River.....	0	0	-----	0	1	0	1	0	1	0	0	-----
Springfield.....	1	0	-----	0	7	0	2	0	0	0	0	16
Worcester.....	0	0	-----	0	4	0	16	1	3	0	0	25
Rhode Island:												
Providence.....	0	0	1	1	1	0	4	0	3	0	0	29
Connecticut:												
Bridgeport.....	0	0	-----	0	1	0	0	0	0	0	0	-----
MIDDLE ATLANTIC												
New York:												
Buffalo.....	0	0	-----	0	1	0	5	0	12	0	0	7
New York.....	16	0	1	0	7	9	57	6	41	0	1	45
Rochester.....	0	0	-----	0	-----	0	1	0	10	0	0	-----
Syracuse.....	0	0	-----	0	-----	0	1	0	3	0	0	23
New Jersey:												
Camden.....	0	0	-----	0	-----	0	0	0	0	0	0	1
Newark.....	0	0	-----	0	4	1	3	2	15	0	0	13
Trenton.....	0	0	-----	0	15	0	2	0	0	0	1	-----
Pennsylvania:												
Philadelphia.....	1	0	4	0	3	0	13	1	18	0	0	52
Pittsburgh.....	4	0	1	0	175	2	9	0	12	0	0	3
Reading.....	0	0	-----	0	2	0	1	0	3	0	0	7
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	1	0	-----	0	-----	0	1	2	8	0	0	3
Cleveland.....	0	0	4	0	38	1	2	4	22	0	0	22
Columbus.....	0	0	-----	0	3	0	6	2	11	0	0	3
Indiana:												
Indianapolis.....	0	0	-----	0	-----	0	4	1	12	0	0	6
South Bend.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Terre Haute.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Illinois:												
Chicago.....	1	0	1	1	6	6	21	9	36	0	0	52
Michigan:												
Detroit.....	5	0	-----	0	2	0	18	0	36	0	0	52
Flint.....	0	0	-----	0	-----	0	1	2	6	0	0	4
Grand Rapids.....	0	0	-----	0	-----	0	1	0	6	0	0	8
Wisconsin:												
Kenosha.....	1	0	-----	0	-----	0	0	0	2	0	0	-----
Milwaukee.....	0	0	-----	0	3	2	3	0	12	0	0	101
Racine.....	0	0	-----	0	-----	0	0	0	5	0	0	4
Superior.....	0	0	-----	0	1	0	0	0	1	0	0	-----
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	1	0	-----	0	1	0	0	0	1	0	0	2
Minneapolis.....	0	0	-----	1	3	1	2	2	5	0	0	-----
St. Paul.....	1	0	-----	0	-----	0	6	0	5	0	0	-----
Missouri:												
Kansas City.....	0	0	-----	0	-----	0	10	0	1	0	0	-----
St. Joseph.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
St. Louis.....	2	0	-----	1	4	1	10	4	7	0	0	4

<sup>1</sup> In some instances the figures include non-resident cases.

## City reports for week ended Nov 30, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha.....	0	0	-----	0	-----	0	3	4	8	0	0	-----
Kansas:												
Topeka.....	0	0	-----	0	-----	0	0	1	2	0	0	-----
Wichita.....	0	0	-----	0	1	0	7	0	3	0	0	-----
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	-----	0	1	0	0	0	0	4
Maryland:												
Baltimore.....	8	0	2	1	2	0	7	2	5	0	0	27
Cumberland.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
Frederick.....	0	0	-----	0	5	0	0	0	0	0	0	-----
District of Columbia:												
Washington.....	0	0	-----	0	1	1	5	0	3	0	0	1
Virginia:												
Lynchburg.....	0	0	-----	0	-----	0	1	0	0	0	0	-----
Richmond.....	0	0	-----	0	11	0	2	0	4	0	0	-----
Roanoke.....	0	0	-----	0	-----	0	0	0	2	0	0	-----
West Virginia:												
Wheeling.....	0	0	-----	0	-----	0	1	0	0	0	0	2
North Carolina:												
Raleigh.....	0	0	-----	0	-----	0	0	0	0	0	0	3
Wilmington.....	0	0	-----	0	7	0	1	0	0	0	0	-----
Winston-Salem.....	1	0	-----	0	11	0	1	0	9	0	0	-----
South Carolina:												
Charleston.....	0	0	7	0	3	0	0	0	0	0	0	-----
Georgia:												
Atlanta.....	0	0	-----	0	2	0	4	0	2	0	0	3
Brunswick.....	0	0	-----	0	2	0	1	0	0	0	0	4
Savannah.....	0	0	1	1	7	0	0	0	0	0	0	-----
Florida:												
Tampa.....	2	0	-----	0	-----	0	2	0	1	0	0	-----
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	3	0	-----	0	5	2	2	0	0	4
Nashville.....	0	0	-----	1	-----	0	3	0	2	0	0	-----
Alabama:												
Birmingham.....	2	0	-----	0	1	0	1	0	2	0	0	-----
Mobile.....	1	0	3	0	-----	0	1	0	0	0	0	-----
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	1	0	-----	0	5	0	0	0	2	0	0	1
Louisiana:												
New Orleans.....	0	0	3	3	1	0	5	3	3	0	0	-----
Shreveport.....	0	0	-----	0	-----	0	0	0	0	0	1	-----
Texas:												
Dallas.....	0	0	-----	0	-----	0	3	0	5	0	0	3
Galveston.....	1	0	-----	0	-----	0	0	0	1	0	0	-----
Houston.....	1	0	-----	0	-----	1	5	3	0	0	0	1
San Antonio.....	5	0	-----	1	-----	0	4	0	2	0	1	6
MOUNTAIN												
Montana:												
Great Falls.....	0	0	-----	0	1	0	0	0	4	0	0	-----
Helena.....	0	0	-----	0	-----	0	0	0	0	0	0	-----
Missoula.....	0	0	-----	0	-----	0	1	0	0	0	0	6
Colorado:												
Denver.....	1	0	4	0	4	0	6	1	19	0	0	4
Pueblo.....	0	0	-----	0	-----	0	2	0	0	0	0	-----
Utah:												
Salt Lake City.....	0	0	-----	0	1	0	3	0	2	0	0	-----

## City reports for week ended Nov. 30, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	0	0	-----	0	-----	1	2	1	0	0	0	2
Spokane.....	0	0	-----	0	6	0	1	2	0	0	0	-----
Tacoma.....	0	0	-----	0	-----	0	0	0	1	0	0	-----
California:												
Los Angeles.....	1	0	3	3	4	1	1	8	23	0	0	12
Sacramento.....	0	0	-----	0	-----	0	1	0	3	0	0	-----
San Francisco.....	1	0	1	0	3	0	4	0	9	0	0	4
Total.....	67	0	39	14	368	29	297	69	433	0	4	604
Corresponding week, 1945..	94	-----	267	25	693	-----	356	-----	670	0	14	682
Average, 1941-45.....	91	-----	441	48	666	-----	425	-----	831	0	14	772

\* 3-year average, 1943-45.

\* 5-year median, 1941-45.

*Dysentery, amebic.*—Cases: Boston 1; New York 1; Philadelphia 1; Wichita 1.*Dysentery, bacillary.*—Cases: Springfield, Mass., 2; Buffalo 1; New York 1; Charleston, S. C., 1.*Dysentery, unspecified.*—Cases: Cincinnati 1; San Antonio 26.*Tularemia.*—Cases: Chicago 1; Detroit 1; Birmingham 1.*Typhus fever, endemic.*—Cases: New York 1; Kansas City 1; New Orleans 2; Houston 1.

## Rates (annual basis) per 100,000 population by geographic groups, for the 82 cities in the preceding table (estimated population, 1945, 33,721,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	28.2	0.0	3.1	3.1	69	6.3	109.7	21.9	97	0.0	0.0	326
Middle Atlantic.....	9.7	0.0	2.8	0.0	95	5.6	42.6	4.2	53	0.0	0.9	70
East North Central.....	5.0	0.0	3.1	0.6	33	5.6	38.1	12.4	98	0.0	0.0	159
West North Central.....	8.0	0.0	0.0	4.0	18	4.0	78.4	22.1	64	0.0	0.0	13
South Atlantic.....	18.4	0.0	16.7	3.3	85	1.7	43.5	3.3	30	0.0	0.0	74
East South Central.....	17.7	0.0	35.4	5.9	6	0.0	59.0	11.8	35	0.0	0.0	24
West South Central.....	23.0	0.0	8.6	11.5	17	2.9	48.8	17.2	37	0.0	5.7	32
Mountain.....	8.5	0.0	34.2	0.0	51	0.0	102.6	8.5	214	0.0	0.0	85
Pacific.....	3.2	0.0	6.3	4.7	21	3.2	14.2	17.4	57	0.0	0.0	28
Total.....	10.4	0.0	6.0	2.2	57	4.5	46.1	10.7	67	0.0	0.6	94

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended November 16, 1946.*—During the week ended November 16, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brun- swick	Que- bec	On- tario	Mani- toba	Sas- katch- ewan	Al- berta	British Colum- bia	Total
Chickenpox.....		11	1	195	377	28	33	60	152	857
Diphtheria.....		5	1	31	13	3	1	1	2	57
German measles.....					15	2	1	3	2	23
Influenza.....					6	2				8
Measles.....		103		145	42	8	277	84	117	776
Mumps.....		6		31	240	23	70	32	89	491
Polio-myelitis.....		1		7	14				1	23
Scarlet fever.....		7	10	119	78	4	2	4	11	235
Tuberculosis (all forms).....		7	10	101	45	9	12	32		216
Typhoid and paraty- phoid fever.....			1	8	3				1	13
Undulant fever.....					1				1	2
Veneral diseases:										
Gonorrhea.....		9	17	74	102	30	29	31	102	394
Syphilis.....	3	9	1	94	89	18	9	7	38	288
Other forms.....									1	1
Whooping cough.....		6		34	51	2	8		5	106

### JAMAICA

*Notifiable diseases—4 weeks ended November 16, 1946.*—During the 4 weeks ended November 16, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox.....	1	6	Leprosy.....		2
Diphtheria.....	3	2	Tuberculosis (pulmonary).....	28	63
Dysentery, unspecified.....	2	5	Typhoid fever.....	7	81
Erysipelas.....	1		Typhus fever (murine).....	1	

# WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, international health organizations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

## CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January- September 1946	October 1946	November 1946—week ended—				
			2	9	16	23	30
ASIA							
Burma.....	C 1,288	1	37	81	18		
Bassein.....	C 29						
Moulmein.....	C 76		37	47	18		
Rangoon.....	C 23						
Ceylon.....	C 82	3			3		
China:							
Anhui Province.....	C 2,739	4					
Chekiang Province.....	C 4,403	197					
Formosa, Island of.....	C 1,980						
Fukien Province.....	C 1,315	40					
Foochow.....	C 686	23					
Honan Province.....	C 1,634	20					
Hopah Province.....	C 262						
Hunan Province.....	C 1,878	140					
Hupeh Province.....	C 357						
Ichang Province.....	C 147						
Kiangsi Province.....	C 1,554	40					
Kiangsu Province.....	C 19,197	21					
Shanghai.....	C 14,549	21	1				
Kwangsi Province.....	C 941						
Kwangtung Province.....	C 4,713	175					
Canton.....	C 1,970	32					
Hong Kong.....	C 504						
Kweichow Province.....	C 8						
Macao, Island of.....	C 2						
Shantung Province.....	C 21						
Szechwan Province.....	C 111	26					
Yunnan Province.....	C 17						
India.....	C 63,133	1,974	1,033				
Bombay.....	C		1		1		
Calcutta.....	C 1,767	48	8		12	8	
Chittagong.....	C 8						
Madras.....	C 3						
India (French).....	C 2						
Indochina (French):							
Cambodia.....	C 272	59					
Cochinchina.....	C 836						
Bien Hoa.....	C 24						
Chaudok.....	C 21						
Mytho.....	C 142	2					
Bachgia.....	C 1						
Saigon-Cholon.....	C 38						
Vinh-long.....	C 7						
Japan.....	C 1,196	4	3				
Korea (Chosen).....	C 11,351						
Malay States.....	C 234			6	3	2	
Manchuria.....	C 18,450						
Mongolia.....	C 16						
Siam (Thailand).....	C 3,396	124					
Bangkok.....	C 463	31	7	9	4	7	
Straits Settlements: Singapore.....	C 1						

<sup>1</sup> Includes imported cases.

<sup>2</sup> Imported.

<sup>3</sup> From the beginning of the outbreak in April or May to approximately Sept. 1, 1946.

## PLAGUE

[C indicates cases; P, present]

Place		January- September 1946	October 1946	November 1946—week ended—				
				2	9	16	23	30
AFRICA								
Algeria.....	C	2						
Bechuanaland.....	C	10	11					
Belgian Congo.....	C	128	2					
British East Africa:								
Kenya.....	C	31	7					
Uganda.....	C	12						
Egypt.....	C	216		1				
Alexandria.....	C	126						
Ismailiya.....	C	27						
Matariya.....	C	12						
Port Said.....	C	18		1				
Suez.....	C	32						
Libya: Tripolitania—Plague-infected rats.....	C	1						
Madagascar.....	C	160	17				16	
Union of South Africa.....	C	2				3		
ASIA								
Burma.....	C	1,151	95	29	38			
Bassein.....	C	23						
Rangoon.....	C	146	8					
China:								
Chekiang Province.....	C	702	8					
Formosa, Island of.....	C	11						
Fukien Province.....	C	4,365						
Amoy.....	C	307						
Foochow.....	C	1,399						
Kiangsi Province.....	C	260	7					
Kwangtung Province.....	C	415						
Yunnan Province.....	C	276	4					
India.....	C	14,484	832	284				
Indochina (French): Cochinchina.....	C	48						
Java.....	C	32	2		1		2	
Manchuria.....	C	52						
Palestine.....	C	16						
Siam (Thailand).....	C	23	4					
EUROPE								
Great Britain: Malta, Island of.....	C	6						
Portugal: Azores.....	C	415						
NORTH AMERICA								
Canada. <sup>1</sup>								
SOUTH AMERICA								
Argentina:								
Buenos Aires. <sup>2</sup>								
Cordoba Province.....	C		1					
Bolivia:								
Chuquisaca Department.....	C	1						
Santa Cruz Department.....	C	12						
Tarija Department—Plague-infected rats.....	P							
Brazil:								
Alagoas State.....	C	2						
Bahia State.....	C	32						
Ceara State.....	C	44						
Parahyba State.....	C	18						
Pernambuco State.....	C	35						
Ecuador:								
Chimborazo Province.....	C	2						
Loja Province.....	C	15	13					
Peru:								
Lambayeque Department.....	C	14						
Lima Department.....	C	19						
Piura Department.....	C	15						
Tumbes Department.....	C	1						
Plague-infected rats.....	P							
OCEANIA								
Hawaii Territory: Plague-infected rats.....		76						

<sup>1</sup> Includes 16 cases of pneumonic plague.<sup>2</sup> For the month of November 1946.<sup>3</sup> Pneumonic plague.<sup>4</sup> Includes 2 cases of pneumonic plague.<sup>5</sup> The imported suspected case previously reported has not been confirmed. Under date of Sept. 14, 1946, plague infection was reported in a pool of fleas from squirrels in Alsask and in a pool of fleas from squirrels in Superb, Saskatchewan.<sup>6</sup> Under date of Dec. 3, 1946, 9 cases of plague with 3 deaths were reported in a distant area of the port zone of Buenos Aires, Argentina, and on Dec. 4, 1946, an additional case was reported.<sup>7</sup> Plague infection was also proved in Hawaii Territory as follows: On Feb. 5, 1946, in a pool of 29 rats; on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice; under date of July 3, 1946, in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats; under date of July 17, 1946, in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats; under date of Sept. 12, 1946, in a pool of 43 fleas recovered from 22 rodents; under date of Oct. 9, 1946, in a pool of 36 rats found on Sept. 10, 1946.

## SMALLPOX

[C indicates cases; P, present]

Place	January- Septem- ber 1946	October 1946	November 1946—week ended—				
			2	9	16	23	30
AFRICA							
Algeria.....	C 253	5					
Angola.....	C 4						
Basutoland.....	C 46						
Bechuanaland.....	C 11						
Belgian Congo.....	C 2,911	165		44			
British East Africa:							
Kenya.....	C 779	30	8	6	29		
Nyasaland.....	C 408	152	77	80			
Tanganyika.....	C 5,108	360	144				
Uganda.....	C 536	22					
Cameroon (French).....	C 69	4		1			
Dahomey.....	C 1,523	47					
Egypt.....	C 380	4					
Eritrea.....	C 23						
French Equatorial Africa.....	C 161	1					
French Guinea.....	C 852	57					
French West Africa: Dakar District.....	C 40						
Gambia.....	C 7						
Gold Coast.....	C 1,003	37	83				
Ivory Coast.....	C 1,319	63					
Liberia.....	C 40						
Libya.....	C 324	152	90	41	29	22	
Madagascar.....	C 1						
Mauritania.....	C 1						
Morocco (French).....	C 1,841	13					
Morocco (Int. Zone).....	C 175						
Morocco (Spanish).....	C 5						
Mozambique.....	C 4						
Nigeria.....	C 5,828	207					
Niger Territory.....	C 452	20					
Rhodesia:							
Northern.....	C 393	14					
Southern.....	C 9	2				2	
Senegal.....	C 95						
Sierra Leone.....	C 407						
Somaliland (Italian).....	C 1						
Sudan (Anglo-Egyptian).....	C 52	1	3				
Sudan (French).....	C 1,958	25					
Togo (French).....	C 232						
Tunisia.....	C 33						
Union of South Africa.....	C 257	P	P	P	P		
ASIA							
Arabia.....	C 1	1					
Burma.....	C 1,734	25	18	9	13		
Ceylon.....	C 360	142					
China.....	C 926	226	98	167	217	196	207
India.....	C 57,378	392	146				
India (French).....	C 3						
India (Portuguese).....	C 27						
Indochina (French).....	C 1,793	221					
Iran.....	C 24						
Iraq.....	C 8					7	7
Japan.....	C 17,656	5	8	13			
Malay States.....	C 613	1,053	164	58	136	69	226
Palestine.....	C 2						
Rhodes, Island of.....	C 1						
Siam (Thailand).....	C 16,634	616					
Straits Settlements.....	C 469			5	71	14	18
Syria and Lebanon.....	C 8						
Turkey (see Turkey in Europe).....							
EUROPE							
Czechoslovakia.....	C 24						
France.....	C 15				1		
Germany.....	C 1						
Gibraltar.....	C 3						
Great Britain:							
England and Wales.....	C 453						
Malta, Island of.....	C 10						
Scotland.....	C 2						

See footnotes at end of table.

## SMALLPOX

Place	January- Septem- ber 1946	October 1946	November 1946—week ended—				
			2	9	16	23	30
EUROPE—continued							
Greece.....	C	114					
Italy.....	C	483					
Portugal.....	C	54		1			
Spain.....	C	7					
Turkey.....	C	16					
Yugoslavia.....	C	1					
NORTH AMERICA							
Canada.....	C	2					
Guatemala.....	C	55					
Honduras.....	C	4					
Mexico.....	C	377	19				
Nicaragua.....	C	3					
SOUTH AMERICA							
Argentina.....	C	68	1				
Bolivia.....	C	874					
Brazil.....	C	1 282	1 7				
Colombia.....	C	789	88				
Ecuador.....	C	47	7				
Paraguay.....	C	1 264	2				
Peru.....	C	451					
Uruguay.....	C	40					
Venezuela.....	C	1 858	1 38	1 10	1 395	1 287	
OCEANIA							
Hawaii Territory.....	C	1					

1 Includes alastim.

2 Includes delayed reports.

3 Imported.

4 Includes imported cases.

5 Off-shiping.

## TYPHUS FEVER\*

[C indicates cases; P, present]

<b>AFRICA</b>							
Algeria.....	C	778	5				
Basutoland.....	C	7					
Belgian Congo 1.....	C	2, 373	51	43			
British East Africa: Kenya 1.....	C	21					
Egypt.....	C	1, 346	31	4		1	
Eritrea.....	C	741	316	24	48		
French West Africa: Dakar District.....	C	7					
Libya.....	C	83	2	1		2	
Morocco (French).....	C	3, 676	28	1			
Morocco (Int. Zone).....	C	53					
Morocco (Spanish).....	C	25					
Nigeria.....	C	28	3				
Rhodesia, Northern.....	C	1					
Sierra Leone 1.....	C	5					
Tunisia 1.....	C	183					
Union of South Africa 1.....	C	357	5				
<b>ASIA</b>							
Arabia 2.....	C	2					
Burma 2.....	C	2					
China 1.....	C	438					
India.....	C	298					
Indochina (French).....	C	61					
Iran.....	C	137					
Iraq.....	C	182	14	3		1	1
Japan.....	C	30, 726	36	5	21		
Malay States.....	C	3					
Palestine 2.....	C	73					
Philippine Islands 2.....	C	3					
Straits Settlements.....	C	1	1				
Syria and Lebanon.....	C	78					
Trans-Jordan.....	C	21					
Turkey. (See Turkey in Europe.)							

See footnotes at end of table.



## TYPHUS FEVER\*

Place	January- Septem- ber 1946	October 1946	November 1946—week ended—				
			2	9	16	23	30
EUROPE							
Albania.....	C	96					
Austria.....	C	34	1				
Belgium <sup>1</sup> .....	C	14					
Bulgaria.....	C	973	6	18	6		
Czechoslovakia <sup>1</sup> .....	C	785					
France <sup>1</sup> .....	C	16					
Germany.....	C	1,867	1				
Great Britain:							
England and Wales.....	C	1					
Malta and Gozo <sup>1</sup> .....	C	21	1				
Greece <sup>1</sup> .....	C	517	33	15	14		5
Hungary.....	C	848	94	32	6	18	
Italy.....	C	24					
Netherlands <sup>1</sup> .....	C	24					
Poland.....	C	3,234	51	25	3	15	
Portugal.....	C	9	1				
Rumania.....	C	7,653	44		45		
Spain.....	C	26					
Canary Islands.....	C	2					
Sweden <sup>1</sup> .....	C	1					
Switzerland <sup>1</sup> .....	C	1	1				
Turkey.....	C	1,171	61	11	10	14	34
Union of Soviet Socialist Republics:							
Ukraine.....	C	P					
Yugoslavia.....	C	2,920			5	12	
NORTH AMERICA							
Costa Rica <sup>1</sup> .....	C	76	1				
Cuba <sup>1</sup> .....	C	20					
Guatemala.....	C	654					
Jamaica <sup>1</sup> .....	C	35	1		1		
Mexico.....	C	1272	197				
Panama Canal Zone.....	C	1					
Panama (Republic).....	C	2					
Puerto Rico <sup>1</sup> .....	C	86	7	3			
Virgin Islands <sup>1</sup> .....	C	3					
SOUTH AMERICA							
Argentina.....	C	5					
Bolivia.....	C	248					
Brazil.....	C	5	1				
Chile.....	C	414					
Colombia.....	C	395	72				
Curacao <sup>1</sup> .....	C	1					
Ecuador <sup>1</sup> .....	C	877	89				
Paraguay.....	C	1					
Peru.....	C	783					
Venezuela <sup>1</sup> .....	C	93	8				
OCEANIA							
Australia <sup>1</sup> .....	C	140					
Hawaii Territory <sup>1</sup> .....	C	57	18		2	2	

\*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

<sup>1</sup> Includes cases of murine type.

<sup>2</sup> Murine type.

1903

December 27, 1946

## YELLOW FEVER

[C indicates cases; D, deaths]

Place	January, Septem- ber 1946	October 1946	November 1946—week ended—				
			2	9	16	23	30
AFRICA							
French Equatorial Africa: Carnot.....	C	-----	-----	-----	-----	1	1 2
Ivory Coast: Seguela.....	C	-----	-----	1 1	-----	-----	-----
Nigeria:							
Ibadan.....	C	1	-----	-----	-----	-----	-----
Ilorin.....	C	1	-----	-----	-----	-----	-----
Kafanchan.....	C	2	-----	-----	-----	-----	-----
Ogbomosho.....	C	41	-----	-----	-----	-----	-----
Sierra Leone: Pujehun.....	C	1	-----	-----	-----	-----	-----
SOUTH AMERICA							
Bolivia: Santa Cruz Department.....	D	1 40	-----	-----	-----	-----	-----
Brazil: Para State.....	D	1	-----	-----	-----	-----	-----
Colombia:							
Caqueta Territory.....	D	1	-----	-----	-----	-----	-----
Magdalena Department.....	D	1	-----	-----	-----	-----	-----
Santander Department.....	D	6	-----	-----	-----	-----	-----
Peru: San Martin Department.....	D	3	-----	-----	-----	-----	-----
Venezuela:							
Tachira State.....	C	4	-----	-----	-----	-----	-----
Trujillo State.....	C	4	-----	-----	-----	-----	-----
Zulia State.....	C	4	-----	-----	-----	-----	-----

1 Suspected.

2 Diagnosis confirmed in 14 cases and 10 deaths.

X



FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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